

UNIVERSITY OF ALBERTA LIBRARY



0 0000 6956 130

LB  
1585.3  
E96  
1977  
gr.2  
tch.ed.  
c.4

CURR





EX LIBRIS  
UNIVERSITATIS  
ALBERTÆNSIS

---





Digitized by the Internet Archive  
in 2017 with funding from  
University of Alberta Libraries















# Exploring Science

GOLD  
BOOK

MILO K. BLECHA  
*Professor of  
Science Education*  
University of Arizona

PETER BEUGGER  
*Science Consultant*  
School District No. 44  
North Vancouver

PETER C. GEGA  
*Elementary School  
Science Specialist*  
San Diego State University

MURIEL GREEN  
*Supervisor of Science*  
Board of Education  
New York City, District 29

ARNOLD V. WIED  
*Principal*  
General Gordon Elementary School  
Vancouver

## *Reviewer/Consultants*

Ruth M. Buck

William Haisell

Lorraine B. Ide

Imogene C. Moody

Penny Sharpe

Cynthia M. Smith

Gladys Stanbury

Neva Lowe Weaver

**DOUBLEDAY CANADA LIMITED  
TORONTO**

## *The Laidlaw Exploring Science Program*

|                   |        |                   |       |
|-------------------|--------|-------------------|-------|
| Exploring Science | ORANGE | Exploring Science | BROWN |
| Exploring Science | GOLD   | Exploring Science | GREEN |
| Exploring Science | BLUE   | Exploring Science | RED   |

*Project Director* Thomas E. Navta / *Production Director* LaVergne G. Niequist / *Art Director* Gloria J. Muczynski /  
*Photo Researcher* William A. Cassin / *Staff Editors* Sally Wilmot Brown, D. Darragh Smithers / *Production Supervisors*  
Donna E. Delaine, Marilyn Sceda / *Production Associate* Judith E. Cihock / *Artists* Patty Boyd, Eric Ford,  
Paul Hazelrigg, Donald Meighan, Larry Mikec / *Cover Design* Donald Meighan

### **Acknowledgments**

The publishers wish to express their appreciation to the following sources for permission to reproduce the photographs on the pages indicated. alfa studio: 53 (both), 133 (both), 140, 141 (both), 142, 143, 145 (both), 156 (both), 157. Artstreet: 168 (both). Artstreet/Robert W. Mundstock, 11 (bottom). Artstreet / A. C. Twomey, 30. J. Babchuk, 56 (right), Robert Borja: 164 (bottom), 167, 176, 177 (both), 186, 187 (both). California Institute of Technology and Carnegie Institution of Washington, 155 (top). Robert Davis: 18 (bottom), 90 (top), 91. Dr. E. R. Degginger: 15 (bottom), 19 (left and top right), 61 (bottom left), 70 (bottom), 74 (right), 98 (both), 99 (both), 109 (both), 118 (right), 123 (both), 154 (top). De Wys, Inc., 150 (right). De Wys, Inc./ R. Schnackenberg, 25 (left).

*(Acknowledgments continued on page 192)*

Copyright © 1977 by **Doubleday Canada Limited**

*All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage or retrieval system, without permission in writing from the publisher.*





CONTENTS



Unit 1 Food for Animals and You

Pages

6–31

|                             |       |
|-----------------------------|-------|
| Animals need food           | 8–9   |
| Food from plants            | 10–13 |
| Food from other animals     | 14–15 |
| Food chains                 | 16–17 |
| Helping animals get food    | 18–19 |
| You need food               | 20–21 |
| Eating food from plants     | 22–23 |
| Eating food from animals    | 24–27 |
| People and food chains      | 28–29 |
| <i>End-of-Unit Features</i> | 30–31 |



Unit 2 Environment

32–63

|  |       |
|--|-------|
| Your environment                         | 34–35 |
| Places in your environment               | 36–37 |
| People in your environment               | 38–41 |
| Animals and plants in your environment   | 42–45 |
| Sound and light in your environment      | 46–49 |
| Air, water, and food in your environment | 50–51 |
| Weather in your environment              | 52–53 |
| Changes in your environment              | 54–55 |
| Plants and their environment             | 56–59 |
| Animals and their environment            | 60–61 |
| <i>End-of-Unit Features</i>              | 62–63 |



### Unit 3 Measuring

Pages

64–95

|                             |       |
|-----------------------------|-------|
| Measuring things            | 66–69 |
| Measuring length            | 70–73 |
| Centimetres                 | 74–77 |
| Decimetres                  | 78–81 |
| Metres                      | 82–85 |
| Measuring how much          | 86–89 |
| Measuring how heavy         | 90–93 |
| <i>End-of-Unit Features</i> | 94–95 |



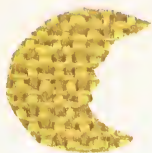
### Unit 4 Magnets

96–127

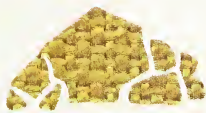
|                                |         |
|--------------------------------|---------|
| Kinds of magnets               | 98–99   |
| Picking things up with magnets | 100–103 |
| Magnets sticking to things     | 104–105 |
| Strong and weak magnets        | 106–109 |
| Strong parts of magnets        | 110–111 |
| Magnets pulling through things | 112–113 |
| Uses of magnets                | 114–117 |
| Magnets sticking together      | 118–119 |
| Magnets pushing away           | 120–121 |
| Making magnets                 | 122–123 |
| Chains of magnets              | 124–125 |
| <i>End-of-Unit Features</i>    | 126–127 |

## Unit 5 The Moon

128–159



|                                |         |
|--------------------------------|---------|
| The moon at night              | 130     |
| The moon during the day        | 131     |
| Moonlight                      | 132–133 |
| Rising and setting of the moon | 134–135 |
| Path of the moon               | 136–137 |
| Shapes of the moon             | 138–143 |
| Seeing one side of the moon    | 144–145 |
| The moon's surface             | 146–147 |
| The moon and the earth         | 148–149 |
| People on the moon             | 150–151 |
| Maps of the moon               | 152–153 |
| Other things in space          | 154–157 |
| <i>End-of-Unit Features</i>    | 158–159 |



## Unit 6 Rocks and Soil

160–189

|                             |         |
|-----------------------------|---------|
| Finding rocks               | 162–165 |
| How rocks are different     | 166–167 |
| Changes in rocks            | 168–171 |
| Using rocks                 | 172–173 |
| What soil is made of        | 174–177 |
| Finding soil                | 178–181 |
| Soil and living things      | 182–183 |
| Taking care of soil         | 184–187 |
| <i>End-of-Unit Features</i> | 188–189 |

## Some Science Words to Know

190–191



# 1 Food for Animals and You



**Preparing for the unit:** For a list of instructional materials helpful in teaching this unit, see page T11 of the Teacher's Manual. These instructional materials include general references for the teacher, books for children, and filmed or recorded materials. You may also wish to check the

list of materials needed for each "Finding Out" activity in this unit and have the children begin collecting these materials. The list of materials for each "Finding Out" activity is given under "Teaching helps for Finding Out" on pages 12, 19, 26, and 27.



Where did Bob get his food?<sup>1</sup>

Where does your food come from?<sup>2</sup>

7

**Introducing the unit:** You may wish to have the children look at the cartoon above. Then have the children read the questions below the cartoon and discuss their answers to the questions.

**Sample answers for questions below the cartoon:**

<sup>1</sup> He got a banana from a banana tree, an apple from an apple tree, corn from a cornstalk, and a

hot dog from a store. A hot dog is made of parts of a hog that have been ground up.

<sup>2</sup> My food comes from trees and other plants that grow in the ground. Some food comes from the ocean. Other food comes from farms where different animals are raised.



## Animals need food



What food are these animals eating?<sup>1</sup>



**Main concept of the lesson (pages 8–9):**

Animals need food to help them live and grow.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that animals need food in order to live and grow.

**Important words:** animals, food.

**1 Sample answer:** The heron (a long-necked wading bird) is eating a fish, the alligator is eating a fish, the raccoon is eating corn, the lions are eating parts of a small animal, and the rabbits are eating cabbage.





Why do you think  
animals need food?<sup>1</sup>

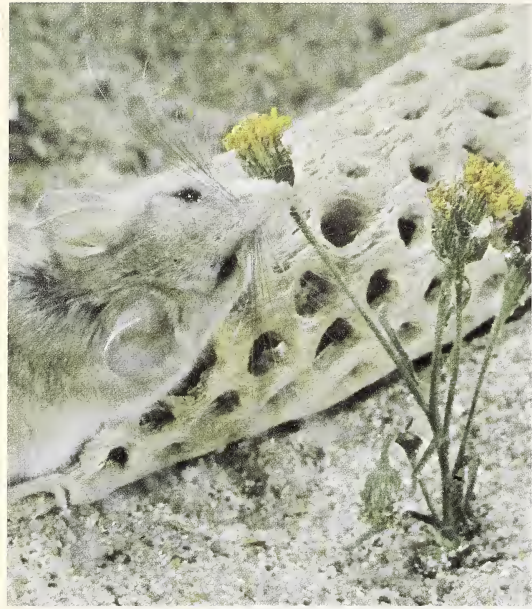


**Suggested discussion:** At this time, you might have the children discuss what might happen to animals if they could not find enough food to eat. (Sample answer: The animals might get sick

and die or they might have to move to new lands to find more food.)

<sup>1</sup> **Sample answer:** All animals need food to help them live and grow.

## Food from plants



**Main concept of the lesson (pages 10–13):**

Some animals need food from plants.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that some animals need food from plants

**Important words:** animals, plants.

**Suggested discussion:** At this time, you might tell the children that animals eat different parts of plants such as the leaves or bark of a tree. Then you might ask them to name some other parts of plants that animals might eat. (Sample answer: Roots, flowers, berries, fruit, nuts, stems, and seeds.)





What food are these animals eating?<sup>1</sup>



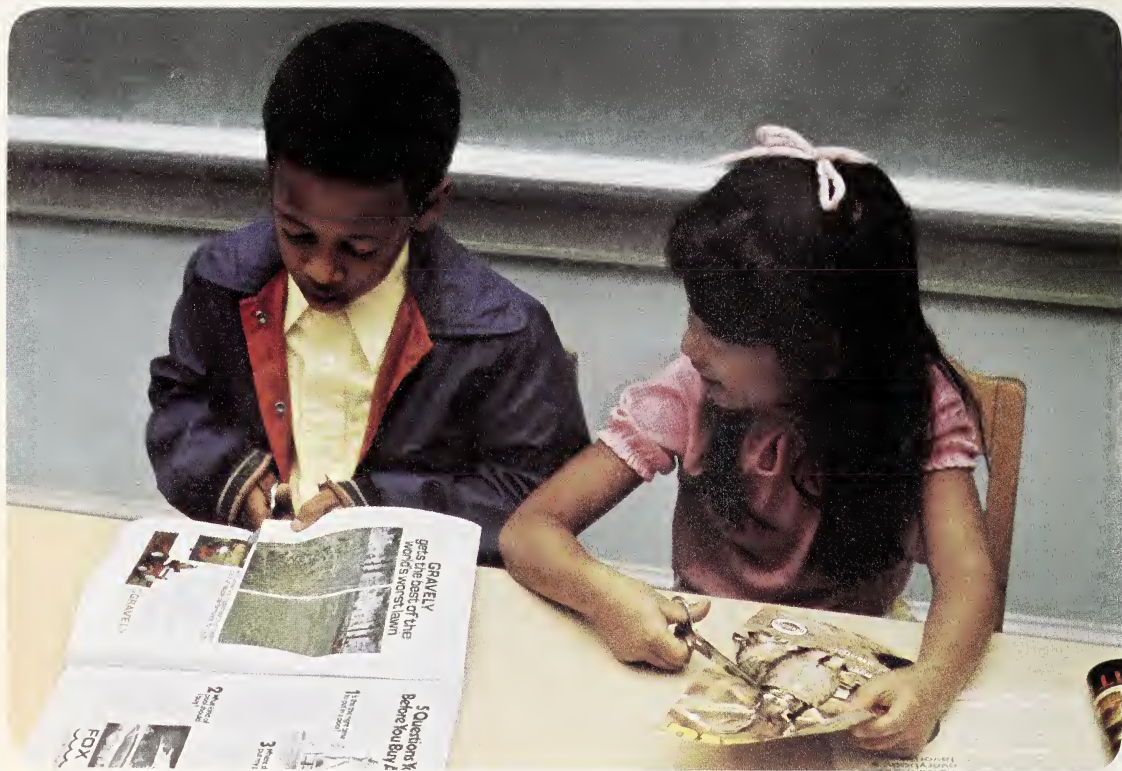
<sup>1</sup> Sample answer: All these animals are eating food from plants. The field mouse is eating a dandelion, the giraffes are eating leaves from

a tree, the caterpillar is eating a leaf, the horses are eating grass, and the butterfly is eating nectar from a flower.



# FINDING OUT

- ▶ Find or draw pictures of some plants.
- ▶ Find or draw pictures of some animals.



12

## Teaching helps for "Finding Out":

*Materials needed:* old magazines, scissors, paper, pencil, crayons.

*Processes used:* collecting data, interpreting data, classifying.

*Additional information:* While many animals eat

some form of plants, you may wish to check various animal books to find out which animals eat which plants. You may also make a dictionary or encyclopedia check to find out which animals do not eat plants at all. Lions, for instance, are meat eaters only.

► Match the animal with the plant it eats.



What other animals have you seen eating food from plants?<sup>1</sup>

<sup>1</sup> Sample answer: Cows, steer, deer, and horses eat grasses. Many birds eat seeds, corn, and

grains from plants. Most worms and caterpillars eat leaves. Squirrels eat nuts from trees.





## Food from other animals



14

### Main concept of the lesson (pages 14–15):

Some animals need food from other animals.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

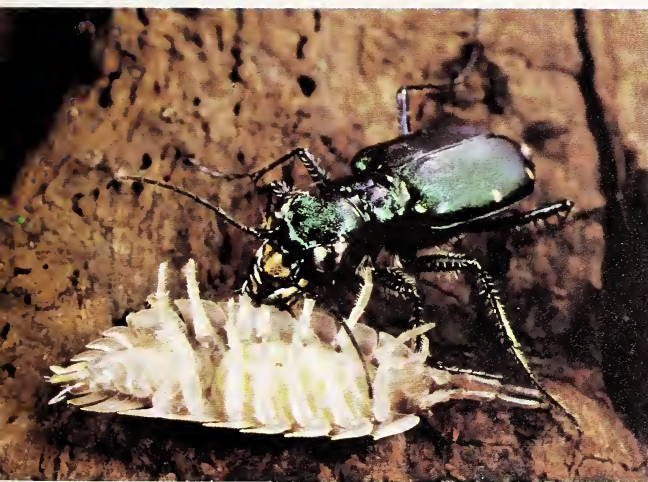
—state that some animals need food from other animals.

**Important words:** food, animals.

**Suggested discussion:** After the children look at

the pictures on these pages, you may wish to discuss some of the food eaten by different animals. You might mention that some animals eat both plants and animals. (Such animals are bears, brown rats, and opossums.) Then you might ask the children this question: Why do you think it is important for some animals to be able to eat both plants and animals?





What food are these animals eating?<sup>1</sup>

What other animals catch animals for food?<sup>2</sup>

<sup>1</sup> **Sample answer:** The gecko (a small lizard) is eating a grasshopper, the puffin (an arctic ocean bird) is eating a fish, the Alaskan brown bear is eating a salmon, and the tiger beetle is eating a pill bug.

<sup>2</sup> **Sample answer:** Many birds catch worms and insects, large fish catch small fish, foxes catch chickens, frogs catch insects and spiders, spiders catch small insects, and anteaters catch ants.

## Food chains



Look at the pictures on these pages.  
What do they show about food for  
animals?<sup>1</sup>

### Main concepts of the lesson (pages 16–17):

All animals are part of food chains.

A food chain helps describe how animals depend on other living things for food. Small animals are eaten by larger animals which are eaten by still larger animals.

**Performance objectives:** After studying the infor-

mation provided in this lesson, the children should be able to

- state that animals are part of food chains;
- give an example of a food chain.

**Important words:** food chain, nature.

<sup>1</sup> **Sample answer:** They show that animals need plants and other animals for their food.





This is a food chain in nature.  
What are some other food chains  
in nature?<sup>1</sup>

**Teaching helps for the pictures above:** As the children look at the pictures on pages 16 and 17, you might have them discuss each of the pictures. In the first picture, an insect is getting its food from a plant (the lily flower). A frog is about to get its food from the insect. In the second picture, a snake is about to catch the frog for its food. In the next picture, a hawk has caught the snake for its food. Finally, a fox has caught the hawk for its food.

**Suggested activity:** As the children learn about food chains, you might have them make a display of a food chain in nature. You might have them find or draw pictures of different plants and animals. Then the children might draw arrows to show how the different plants and animals are part of food chains.

<sup>1</sup> **Sample answer:** Leaf—worm—fish—bird. Plant—  
insect—bird—snake.



## Helping animals get food



Why do you think people must help these animals get their food?<sup>1</sup>

18

**Main concept of the lesson (pages 18–19):**

People help some animals get their food.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that people must help some animals get their food.

**Important words:** animals, food.

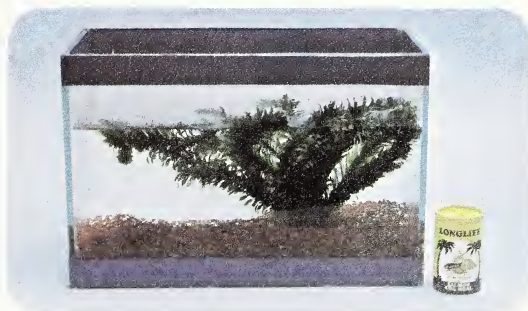
**Teaching helps for the pictures above:** You might explain that animals which are pets in a home

or animals that are raised on a farm need people to help them get their food. You might also mention that animals that are kept in zoos and marinas must also have people feed them. Encourage children with pets to give them proper care and good food.

**<sup>1</sup> Sample answer:** These animals are kept in closed places and are unable to go out and find their own food. Because of this, people must feed these animals to help them live and grow.

# FINDING OUT

- Get some paper.
- Draw the animals that need each food.



What other animals may need people to help them get their food?<sup>1</sup>

19

## Teaching helps for "Finding Out":

*Materials needed:* paper, pencil, crayons.

*Processes used:* classifying, inferring.

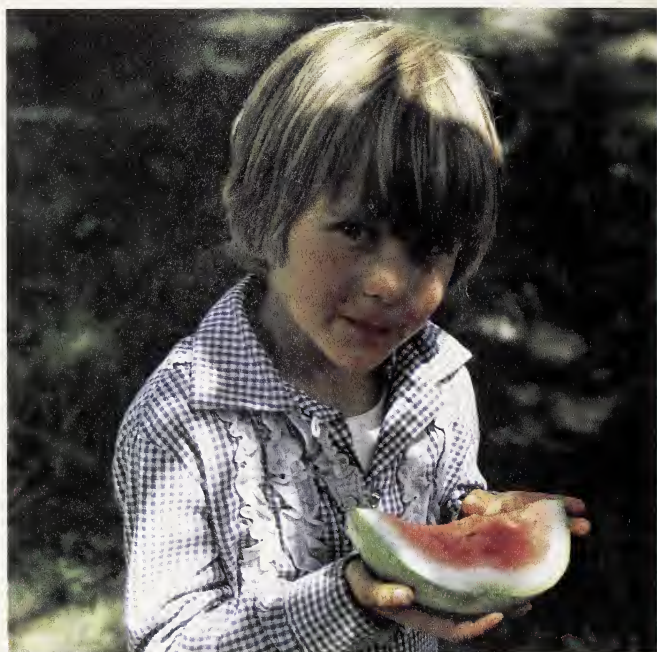
*Sample findings:* The birdseed in the birdcage may be eaten by a pet bird. The dog food may be eaten by any pet dog. The fish food by the fish tank may be eaten by a pet fish.

<sup>1</sup> *Sample answer:* Any animal may be named as long as it is not a wild animal. Animals that are kept as pets in a home, animals that are kept in zoos, animals that are raised on farms, and animals that are kept in national parks all need people to help them get their food.





## You need food



What food are these people eating?<sup>1</sup>

**Main concept of the lesson (pages 20–21):**

You need food in order to live and grow.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that people need food in order to live and grow.

**Important words:** people, food.

<sup>1</sup> **Sample answer:** Meat, vegetables, milk, fruit, bread.



Why do you think  
you need food?<sup>1</sup>



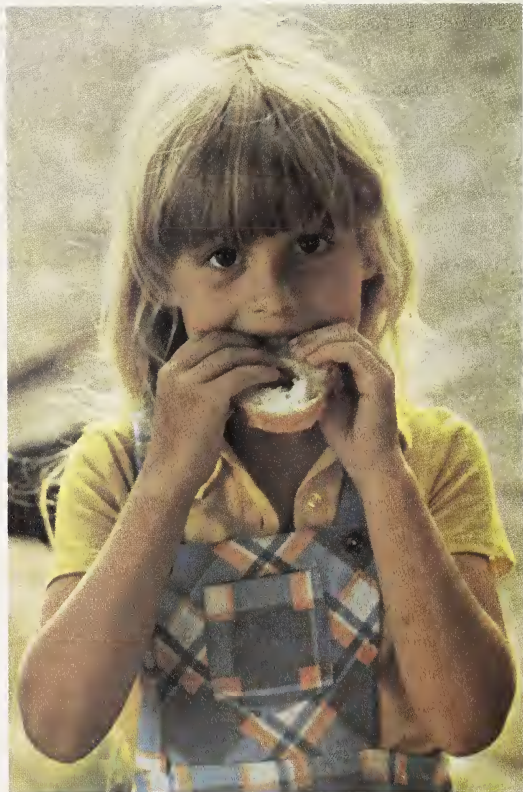
**Suggested activity:** At this time, you might suggest that the children make a picture display of different kinds of food. The children may cut out pictures of food from old magazines or draw pictures of their favourite foods.

**Suggested discussion:** You might encourage the children to discuss some of the ways in which food can help them grow and be healthy. You might also encourage the children to think of

food as important to the growth of their body, the development of new teeth and stronger bones, and the development of their mental growth. You might ask questions such as these: How does eating food help you run and jump? How does eating food help you grow?

**<sup>1</sup> Sample answer:** I need food to help me live and grow.

## Eating food from plants



### **Main concept of the lesson (pages 22–23):**

People need food from plants.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that people need food from plants.

**Important words:** people, plants.

**Suggested activity and discussion:** At this time, you might suggest that the children find out which food in their homes comes from plants.

They might also make a list of food in a grocery store that comes from a plant. You might have them discuss the different kinds of plants and the different parts of plants which provide food. For example, apples grow on trees, carrots grow underground, peanuts grow in shells, bread is made from grain, tomatoes grow on vines, and some berries grow on bushes. The children may then wish to know how their favourite foods are grown.





What food from plants  
are these people eating?<sup>1</sup>

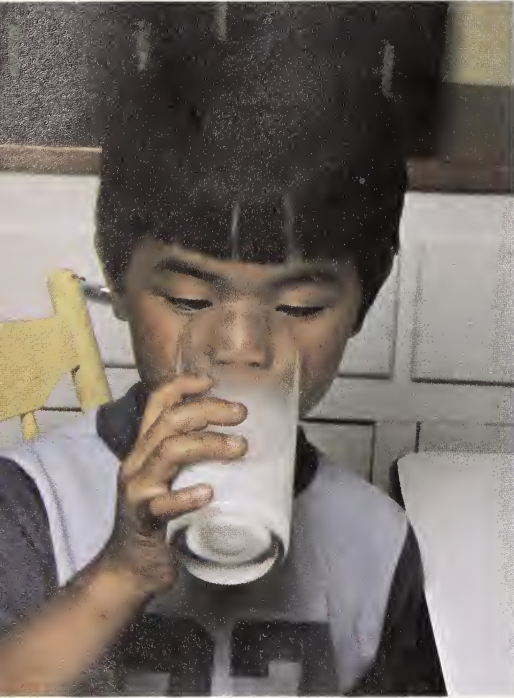
What food from plants  
do you like to eat?

<sup>1</sup>**Sample answer:** Orange (from an orange tree),  
bread (from harvested grain milled into flour),

apple (from an apple tree), and pickle (from a  
cucumber plant).



## Eating food from animals



**Main concept of the lesson (pages 24–25):**

People need food from animals.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that people need food from animals.

**Important words:** people, animals.

**Suggested activity:** As the children are looking at the pictures on these pages, you might suggest that the children think of the different kinds of meat they eat that comes from animals. You might also encourage the children to look at the meats in a grocery store and find out which animals provide each food.



What food from animals  
are these people eating?<sup>1</sup>

What animal gives us  
each food?<sup>2</sup>

**Suggested discussion:** After the children have looked at the milk and the ice cream, you might tell them that these are dairy products which come from a cow. You then might ask them to name some other dairy products. (Sample answer: Milk shakes, cottage cheese, cream cheese, regular cheese, cream, yogurt, and buttermilk.)

<sup>1</sup> **Sample answer:** Milk, hamburger, ice cream, chicken.

<sup>2</sup> **Sample answer:** Milk comes from a cow, hamburger comes from a steer, ice cream is made from a cow's milk, and chicken comes from a chicken.



# FINDING OUT

- Match each food with the plant it comes from.



- Find or draw other pictures of food from plants.

Where can people get food from plants?<sup>1</sup>

## Teaching helps for "Finding Out":

*Materials needed:* old magazines, paper, pencil, crayons.

*Processes used:* observing, interpreting data, classifying.

*Sample findings:* Tomatoes come from a tomato

vine, corn comes from a cornstalk, carrots come from roots of a carrot plant, and an apple comes from an apple tree.

<sup>1</sup> *Sample answer:* Food from plants may come from underground, on the ground, bushes, trees, vines, and stalks.



## FINDING OUT

- Match each food with the animal it comes from.



- Find or draw other pictures of food from animals.

Where can people get food from animals?<sup>1</sup>

### Teaching helps for "Finding Out":

*Materials needed:* old magazines, pencil, paper, crayons.

*Processes used:* observing, interpreting data, classifying.

*Sample findings:* Bacon comes from the hog, cheese and milk come from the cow, and turkey comes from the turkey.

<sup>1</sup> *Sample answer:* Grocery stores and meat markets.

## People and food chains



Look at the pictures on these pages.

What do they show about food for people?<sup>1</sup>

28

**Main concept of the lesson (pages 28–29):**

People are part of food chains.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that people are part of food chains.

**Important words:** food chain, farm.

**<sup>1</sup> Sample answer:** The food which people eat is part of a food chain. Living things depend on other living things for food.



This is a farm food chain.  
What are some other  
farm food chains?<sup>1</sup>



**Teaching helps for the pictures above:** As the children are looking at the pictures on pages 28 and 29, you might have them discuss each of the pictures and follow the direction in which the arrows are pointing. The first picture shows corn which is grown on a farm. The second picture shows a child feeding corn to some hens. The third picture

shows an egg which has been laid by a hen. Finally, the last picture shows an egg being eaten by a child. Each living thing pictured is a link in a farm food chain.

<sup>1</sup> **Sample answer:** Grass—cow—milk—cheese—people. Corn and soybeans—hogs—bacon—people.



## Words to Know

food  
food chain

plant  
nature

animal  
farm

## Picture to Think About



What is happening  
in this picture? Why?

30

**Reviewing the important words:** You may wish to use the words under "Words to Know" to help the children review the important words in this unit.

**Applying knowledge:** You may wish to encourage the children to apply the knowledge they have gained about some of the concepts in this unit. Have the children look at the picture under "Picture to Think About." Then have them read the

questions under the picture and discuss their answers to the questions.

**Sample answers for "Picture to Think About":** The insect which once fed on a smaller insect or a plant is now being used for food for the young birds. All animals are part of a food chain which helps them live and grow.

# Questions to Answer

1. Where do animals get their food?
2. What food from plants do you eat?
3. What food from animals do you eat?



# Fun Things to Do

Draw pictures of animals.  
Show them eating the food  
they like to eat.

Plant a garden.  
Grow the plants  
you like to eat.

**Suggestions for evaluation:** You may wish to use the questions under "Questions to Answer" to evaluate the children's understanding of the main concepts of the unit.

**Sample answers for "Questions to Answer":** 1. Animals get their food from plants and other animals. 2. Answers may vary. 3. Answers may vary.

**For further involvement:** You may wish to use "Fun Things to Do" to involve the children in fun activities which reinforce some of the main concepts of the unit "Food for Animals and You." You may also wish to encourage the children to make up additional activities related to this unit.



## 2 Environment



**Preparing for the unit:** For a list of instructional materials helpful in teaching this unit, see page T11 of the Teacher's Manual. These instructional materials include general references for the teacher, books for children, and filmed or recorded materials. You may also wish to check the

list of materials needed for each "Finding Out" activity in this unit and have the children begin collecting these materials. The list of materials for each "Finding Out" activity is given under "Teaching helps for Finding Out" on pages 37, 40, 44, 48, 53, and 58.



How did things around Dee change?<sup>1</sup>

What things around you change?<sup>2</sup>

33

**Introducing the unit:** You may wish to have the children look at the cartoon above. Then have the children read the questions below the cartoon and discuss their answers to the questions.

**Sample answers for questions below the cartoon:**

<sup>1</sup> The rain got harder; the water around her got deeper; her clothes got wetter.

<sup>2</sup> The weather, people, plants, animals.





## Your environment



**Main concept of the lesson (pages 34–35):**

Your environment is everything around you.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—explain what environment is.

**Important word:** environment.

**Suggested activity:** After discussing the lesson on pages 34 and 35, you might want to point out to the children that everyone's environment is not exactly the same. However, everyone's environment is made up of many of the same kinds of things. Then you may wish to involve the children in an activity which would help them



What are some things  
around these children?<sup>1</sup>

Everything around these children  
makes up their environment.

What are some things  
that make up your environment?<sup>2</sup>

understand the concept of environment. Have the children collect pictures from magazines of things that make up their environment. Then have the children sort the pictures so that they have a group of pictures showing living things and a group of pictures showing nonliving things.

The two groups of pictures might then be displayed on a bulletin board.

<sup>1</sup> **Sample answer:** Trees, people, buildings, grass, bushes, a horse.

<sup>2</sup> **Sample answer:** My home, family, school, toys, animals, plants.



## Places in your environment



What places help make up these children's environment?<sup>1</sup>

Are these parts of their environment important to the children? If so, how?<sup>2</sup>

### Main concept of the lesson (pages 36–37):

Your environment includes many places.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—name two places that help make up their environment.

**Important word:** environment.

**Suggested discussion:** After discussing “Places in your environment,” you may wish to ask the

children these questions: What are some places that help make up your environment? How are they important to you? (Sample answers: My home gives me somewhere to sleep and to be with my family. A clothes store gives me somewhere to get new clothes to keep me warm.

<sup>1</sup> **Sample answer:** An ice-cream store, a playground.

<sup>2</sup> **Sample answers:** Yes. They give the children somewhere to get food and somewhere to play.

# FINDING OUT

- Find or draw pictures of some places in your environment.



What things do you do  
when you are in these places?<sup>1</sup>

37

## Teaching helps for "Finding Out":

*Materials needed:* paper, crayons or pencils.

*Processes used:* communicating, using spatial relationships.

<sup>1</sup> *Sample answer:* I sleep, eat, and watch television in my home. I play with my friends in the park. I learn things in school.

*Extending the "Finding Out":* At this time, you may wish to have the children discover some other places in their environment. You might do this by helping the children plan a trip to a museum or library. After the trip, have the children discuss their findings.



## People in your environment



38

**Main concept of the lesson (pages 38–41):**

Your environment includes many people.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—name some people who help make up their environment

**Important words:** environment, people

**Suggested discussion and research:** After discussing the lesson on pages 38–41, you may wish to

ask the children this question: Who are some people in your environment? (Sample answer: My parents, grandparents, and cousins; librarian; garbage collector; principal; bus driver; salesperson.) You might then have the children choose some people who have a job and ask the people where they work and what they do when they do their job. Then have the children report their findings to the class.



Who are the people  
in these children's environment?<sup>1</sup>

Are these people important  
to the children? If so, how?<sup>2</sup>



<sup>1</sup> Sample answer: A doctor, a father, a sister, some good friends, a teacher, some classmates, a crossing guard.

<sup>2</sup> Sample answers: Yes. A doctor may help the children keep healthy and grow the way they should. A father may help the children learn

things and give the children love and food. A sister, friends, and classmates are people with whom the children may play and share things. A teacher may help the children learn things. A crossing guard may help the children keep safe.



# FINDING OUT

- Tell who these people are.
- Point to the places on the next page where you might find these people.



Are these people important in your environment? If so, how?<sup>1</sup>

## Teaching helps for "Finding Out":

*Materials needed:* none.

*Processes used:* communicating, interpreting data.

*Sample findings:* The children will most likely find that the fire fighter would be found in or near the fire trucks, the police officer would be

found in or near the police car, and the mail carrier would be found in or near the mail truck.

<sup>1</sup> *Sample answers:* Yes. The fire fighter helps keep me safe by putting out fires. The police officer helps keep me safe by helping people to obey laws. The mail carrier brings mail to my home.



*Extending the "Finding Out":* At this point, you may wish to help the children find out more about fire fighters, police officers, or mail carriers. You might do this by helping the children plan a trip

to a fire station, police station, or post office in order to talk to the people who work in these places. Have the children report their findings to the class.





## Animals and plants in your environment



What are some animals  
in your environment?<sup>1</sup>



**Main concept of the lesson (pages 42–45):**

Your environment includes many animals and plants

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—explain that many animals and plants help make up their environment.

**Important words:** animals, plants.

**Suggested discussion:** At this time, you may wish

to point out to the children that there are safe ways to act around all animals. Then you might ask the children how they act safely around some animals. (Sample answers: I do not pet or feed strange dogs and cats. I do not try to catch wild animals such as birds and squirrels. I do not try to touch wild animals, such as lions and bears, in a zoo or climb near their cage.)

<sup>1</sup> **Sample answer:** Dogs, cats, gerbils, horses.



Where do some plants grow  
in your environment?<sup>1</sup>

How do animals and plants  
make you feel?<sup>2</sup>

Are you important  
to some animals or plants? Why?<sup>3</sup>

**Suggested discussion:** After discussing the material on pages 42 and 43, you may wish to point out to the children that many plants are food for many animals. Many animals are food for other animals. And many dead animals and plants become part of the soil that many plants grow in. You might then ask the children if they think animals and plants are important to people and why. (Sample answers: Yes. Because much of people's food comes from animals and plants.)

<sup>1</sup> **Sample answer:** In the park, in pots in my home, in the school yard, in the forest preserve.

<sup>2</sup> **Sample answer:** Happy, good.

<sup>3</sup> **Sample answers:** Yes. I am important to my pet because I feed it and keep it clean. I am important to plants in my house and in my garden because I give them water. I am important to wild animals and plants because I leave them alone so that they can grow.



## FINDING OUT

- Draw a circle on the ground.



- Look at things in the circle for about 15 minutes.

### Teaching helps for "Finding Out":

*Materials needed:* stick, crayon or pencil, paper, watch.

*Processes used:* observing, comparing, communicating.

*Sample findings:* The children will most likely find that the things they saw in their circle were different in size, shape, colour and texture. The children may also find that some things were living and some things were nonliving.

*Extending the "Finding Out":* The children may have noticed that some things in their circle were very small. You might want to have the children explore other parts of their environment for other small things. Have the children report their findings to the class. You might also have the children return to their circle to observe and draw things about a week later. You may wish to have the children compare these drawings with their earlier drawing.

- Draw a picture of some things you saw.



How are the things  
you saw different?  
How are they alike?



## Sound and light in your environment



46

**Main concept of the lesson (pages 46–49):**

Your environment includes sound and light.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that sound and light help make up their environment

**Important words:** sound, light.

**Suggested activity:** After discussing “Sound and light in your environment,” you may wish to have

the children play a game which will help them determine how well they listen to sounds. You may do this by having the children listen to you clap your hands together several times. Then ask the children to tell you how many times you clapped your hands. You might repeat this activity a few times, changing the number of times you clap your hands each time. You might also have the children play such games as “Mother may I” and “Simon says.”

How is sound helpful to you?<sup>1</sup>  
How is light helpful to you?<sup>2</sup>  
Are sounds and light always helpful?  
Why or why not?<sup>3</sup>



**Suggested activity:** After discussing the lesson on pages 46–49, you might want to have the children explore their environment to find as many different kinds of light as they can. Have the children draw a picture of each light. Then have the children tell the class what each light is often used for.

<sup>1</sup> **Sample answer:** It helps me learn things. It

helps me keep safe. It helps me enjoy movies and television. It helps me talk with people.

<sup>2</sup> **Sample answer:** Light shines on things so that I can see them. Light from the sun is warm and keeps me warm. Light helps keep me safe.

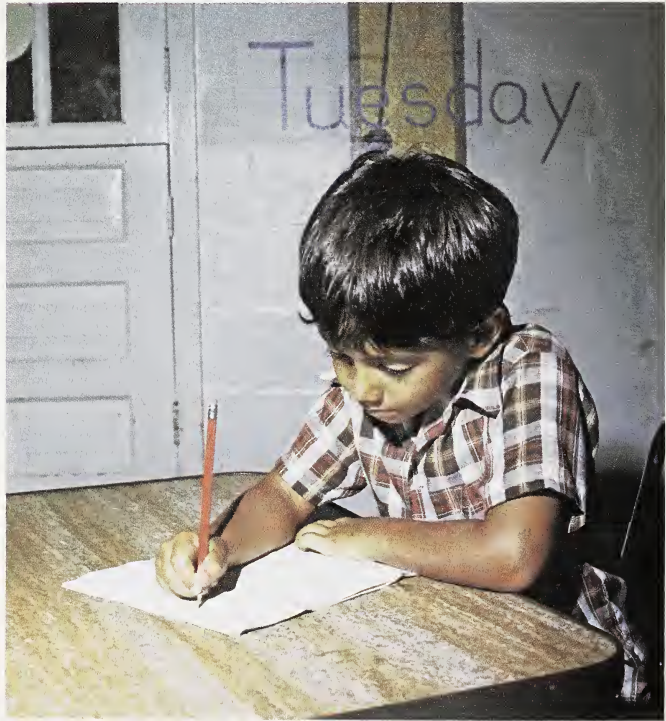
<sup>3</sup> **Sample answers:** No. Sounds that are too loud might hurt my ears. Light that is too bright might hurt my eyes.



## FINDING OUT



- ▶ Sit in a room and listen for sounds.
- ▶ Write the name of everything in the room that makes a sound.



**Teaching helps for "Finding Out":**

*Materials needed:* pencil, paper.

*Processes used:* observing, inferring, comparing.

*Sample findings:* The children may find that there were more sounds outside because there were more people doing things outside.

► Sit outdoors and listen for sounds.



► Write the name of everything that makes a sound.



Which things made a loud sound?<sup>1</sup>

Which things made a quiet sound?<sup>2</sup>

Were there more sounds  
inside or outside? Why?

<sup>1</sup> Sample answer: Cars, trucks, machines used by people fixing the road, people coughing.

<sup>2</sup> Sample answer: Book's pages being turned, a clock, people whispering.

Extending the "Finding Out": At this time, you

may wish to ask the children the following question: Besides being soft or loud, how were the sounds you heard different? (Sample answer: Some were high and some were low. Some lasted a long time and some lasted a short time.)



## Air, water, and food in your environment



50

### Main concept of the lesson (pages 50–51):

Your environment includes air, water, and food.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that air, water, and food help make up their environment.

**Important words:** air, water, food.

**Suggested activity:** After discussing the material on pages 50 and 51, you may wish to point out to

the children that some foods help them grow more than other foods help them. You might then help the children make up a story about eating foods that help them grow.

**Suggested activity and discussion:** After discussing “Air, water, and food in your environment,” you may wish to involve the children in an activity which would help them find evidence that there is air around them. They may do this by cutting a small hole in each corner of a square



How is air important to you?<sup>1</sup>  
 How is water important to you?<sup>2</sup>  
 How is food important to you?<sup>3</sup>

rag. Next, have the children cut some string into 4 equal pieces. You may have to help the children put a piece of string into each hole and tie the string to each corner. Then have the children drop a small, heavy object such as an eraser out in front of them. The children may then tie each string to the object and drop the object again to see that it dropped more slowly the second time because air caught the rag and slowed it down.

You might then want to have the children think up and perform other activities which would show that there is air around them.

<sup>1</sup> **Sample answer:** I need to breathe air in order to live.

<sup>2</sup> **Sample answer:** I need to drink water to live. I like to swim in water. I use water to wash things.

<sup>3</sup> **Sample answer:** I need food to live and grow. I like to eat many foods because they taste good.



# Weather in your environment

What kinds of weather make up your environment?<sup>1</sup>

Does the weather help things in your environment?

If so, how?<sup>2</sup>



**Main concept of the lesson (pages 52–53):**

Your environment includes weather.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—explain that weather helps make up their environment.

**Important word:** weather.

**Suggested discussion:** After discussing this lesson, you may want to ask the children this ques-

tion: How does the weather change in your environment from season to season? (Sample answer: It gets cool in fall, cold and snowy in winter, warm in spring, hot in summer. It doesn't change much. It stays warm most of the year.)

<sup>1</sup> **Sample answer:** Sunny, rainy, snowy, cloudy, hot, cold, warm.

<sup>2</sup> **Sample answers:** Yes. Rain and sun help plants grow.

## FINDING OUT



- Make a calendar and some weather pictures.



- Put the weather pictures on the calendar.

What do you do in each kind of weather?<sup>1</sup>  
How does each kind of weather make you feel?<sup>2</sup>

### Teaching helps for "Finding Out":

**Materials needed:** large poster board, coloured paper, scissors, crayons, tape, ruler.

**Processes used:** observing, collecting data, communicating.

<sup>1</sup> **Sample answers:** I wear warm clothing and build snow people when the weather is cold and snowy. I play indoors when it is raining, but if I go out, I wear a raincoat and boots. I play outside and go swimming when it is warm and sunny.

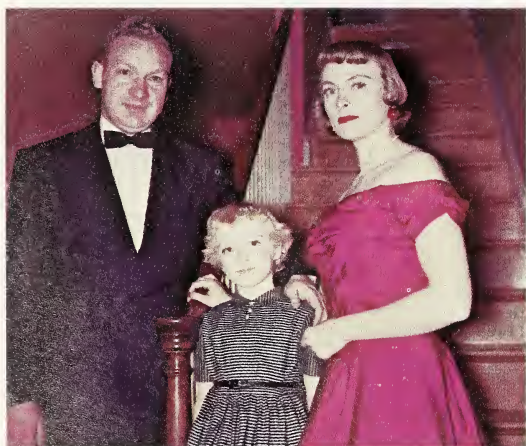
<sup>2</sup> **Sample answer:** I feel good when the weather is nice. I feel sad when it is rainy or too cold.

**Extending the "Finding Out":** At this time, you may wish to ask the children what plants and animals do in each kind of weather. (Sample answer: Some plants lose their leaves in cool fall weather and grow new leaves in warm spring weather. Some animals grow thick fur and sleep during cold weather.)





## Changes in your environment



**Main concept of the lesson (pages 54–55):**

Things in your environment change.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—give examples of some things in their environment that have changed.

**Important words:** environment, change.

**Suggested discussion:** Before discussing “Changes

children to look around the room. You might then ask these questions. What has changed in the room since you left school yesterday? What has stayed the same? (Sample answers: The chalkboard is clean. Two children are absent. Everyone has different clothes on. There is something new on the table. The bulletin board and bookshelves look the same. The chairs and desks are in the same places.)



What things in these environments have changed?<sup>1</sup>

How have the things changed?<sup>2</sup>

What things in your environment have changed?<sup>3</sup>

<sup>1</sup> **Sample answer:** People, buildings, land, trees.

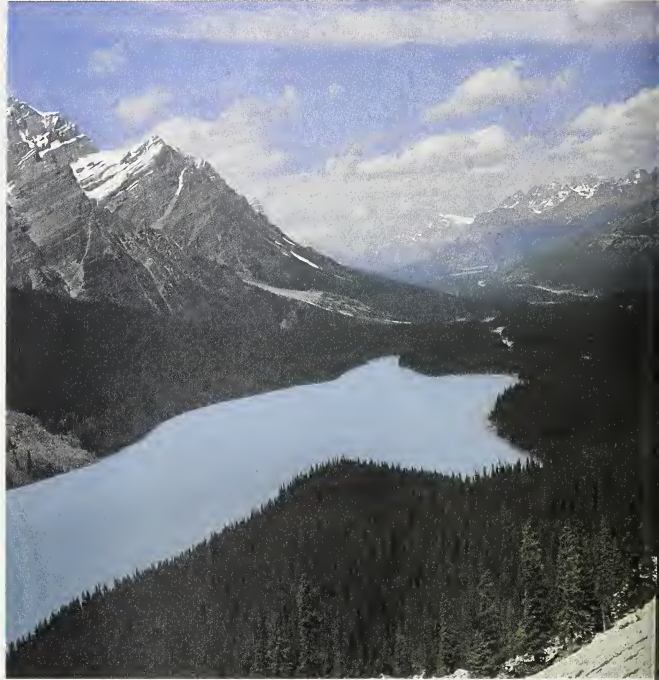
<sup>2</sup> **Sample answer:** The people got older. Their hair got longer and shorter. The girl got taller. The building in the top picture above is being knocked down. New buildings are being built and are covering the land in the bottom picture above.

The trees in the bottom picture on page 54 are losing their leaves.

<sup>3</sup> **Sample answer:** Plants have grown taller. Leaves of trees have changed colour and have fallen off the trees. New houses have been built. People have become older, fatter, or taller.



# Plants and their environment



What things make up  
these plants' environment?<sup>1</sup>  
How is each environment different?<sup>2</sup>

## Main concept of the lesson (pages 56–59):

Plants have an environment.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—name some things that make up a plant's environment.

<sup>1</sup> **Sample answer:** Water, air, sunlight, people, snow, sand.

<sup>2</sup> **Sample answer:** The plants' environment in the picture above on the left is wet and probably warm. The plants' environment in the picture above on the right, of Peyto Lake in Banff National Park, is drier and probably colder. The plants' environment in the top picture on page 57 is probably very dry and very hot. The plants' environment in the bottom picture on page 57 is probably not too hot and not too wet.



**Suggested research:** After discussing "Plants and their environment," you may wish to point out to the children that some plants that live in one kind of environment cannot live in any other kind

of environment. You might then want to have the children look in magazines for pictures of different kinds of plants and their environment.



## FINDING OUT

- Make an environment for plants



- Plant some plants.



58

### Teaching helps for "Finding Out":

*Materials needed.* glass container or terrarium, plants, soil, sand, glass top, tape.

*Processes used:* observing, comparing, experimenting.

*Sample findings:* After watching the plants in the terrarium for a few weeks, the children will most likely see that the plants grow. The children will

also probably notice drops of water on the glass.

*Additional information:* Some of the children may wish to know why water forms on the glass. To answer this question, you might tell the children that plants take in water from the soil and put some of it into the air. The water from the air then gathers on the glass.

► Water the plants.



► Cover the environment with glass.

► Watch the environment for a few weeks.

What changes in the plants  
did you see?

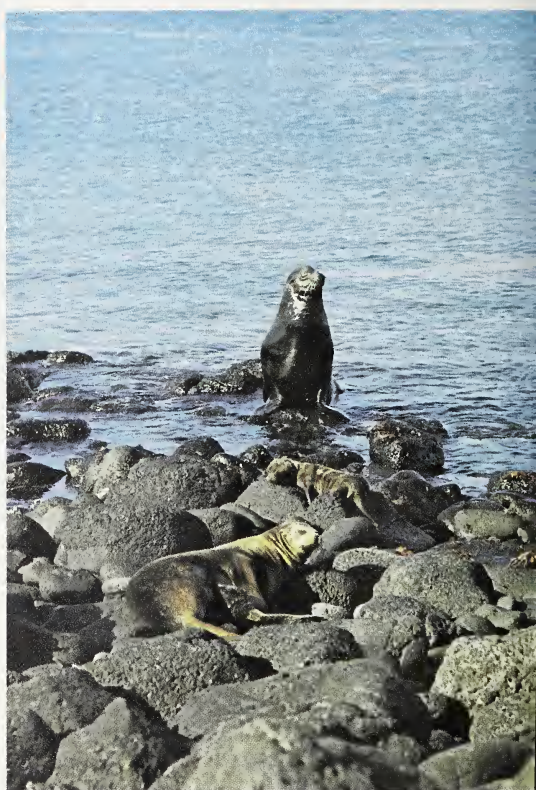
What changes in their environment  
did you see?

**Suggested activity and discussion:** After completing the “Finding Out” above, the children might try exploring the environment around their home or school to find out where plants are growing and

where they are not growing. You may wish to have the children report their findings to the class and explain why they think plants grow in some places and not in others.



## Animals and their environment



### **Main concept of the lesson (pages 60–61):**

Animals have an environment.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—name some things that make up an animal's environment.

**Suggested research:** After discussing “Animals in their environment,” you might want to point out to the children that like different kinds of plants, different kinds of animals often live in different environments. You may wish to have the children look in magazines for pictures of different kinds of animals and their environment.





What are some things  
in these animals' environment?<sup>1</sup>  
How is each environment  
different?<sup>2</sup>



<sup>1</sup> **Sample answer:** Mountains, air, water, rocks, snow, ice, people, grass, trees, sunlight.  
<sup>2</sup> **Sample answer:** The animals' environment in the left-hand picture on page 60 is dry and probably cool. It has mountains. The animals' environment in the right-hand picture is wet and rocky. The animals' environment in the top picture on this

page is a zoo. There are people and trees, but the animals are not free to wander very far. The animals' environment above and to the left is probably very cold, snowy, and icy. The animals' environment above to the right is flat and grassy. It is probably warm.



## Words to Know

environment  
water  
food  
animals

weather  
air  
people

sound  
light  
plants

## Picture to Think About



In what ways is this environment important to this child?

62

**Reviewing the important words:** You may wish to use the words under "Words to Know" to help the children review the important words in this unit.

**Applying knowledge:** You may wish to encourage the children to apply the knowledge they have gained about some of the concepts in this unit. Have the children look at the picture under "Picture to Think About." Then have them read the

question under the picture and discuss their answer to the question.

**Sample answer for "Picture to Think About":** It is important in that it gives him food to eat, people to talk to and love, a chance to be helpful, a place to keep him warm, light to see things, and air to breathe.

## Questions to Answer

1. What is your environment?
2. What are some things in your environment?
3. What are some things in a plant's environment?
4. What are some things in an animal's environment?

## Fun Things to Do

Make up a play about people who live in an environment different from yours.

Make an environment for animals.  
Put a board on the ground.  
Pick up the board after about a week.  
Look at the environment under the board.  
What animals can you find?

**Suggestion for evaluation:** You may wish to use the questions under "Questions to Answer" to evaluate the children's understanding of the main concepts of the unit.

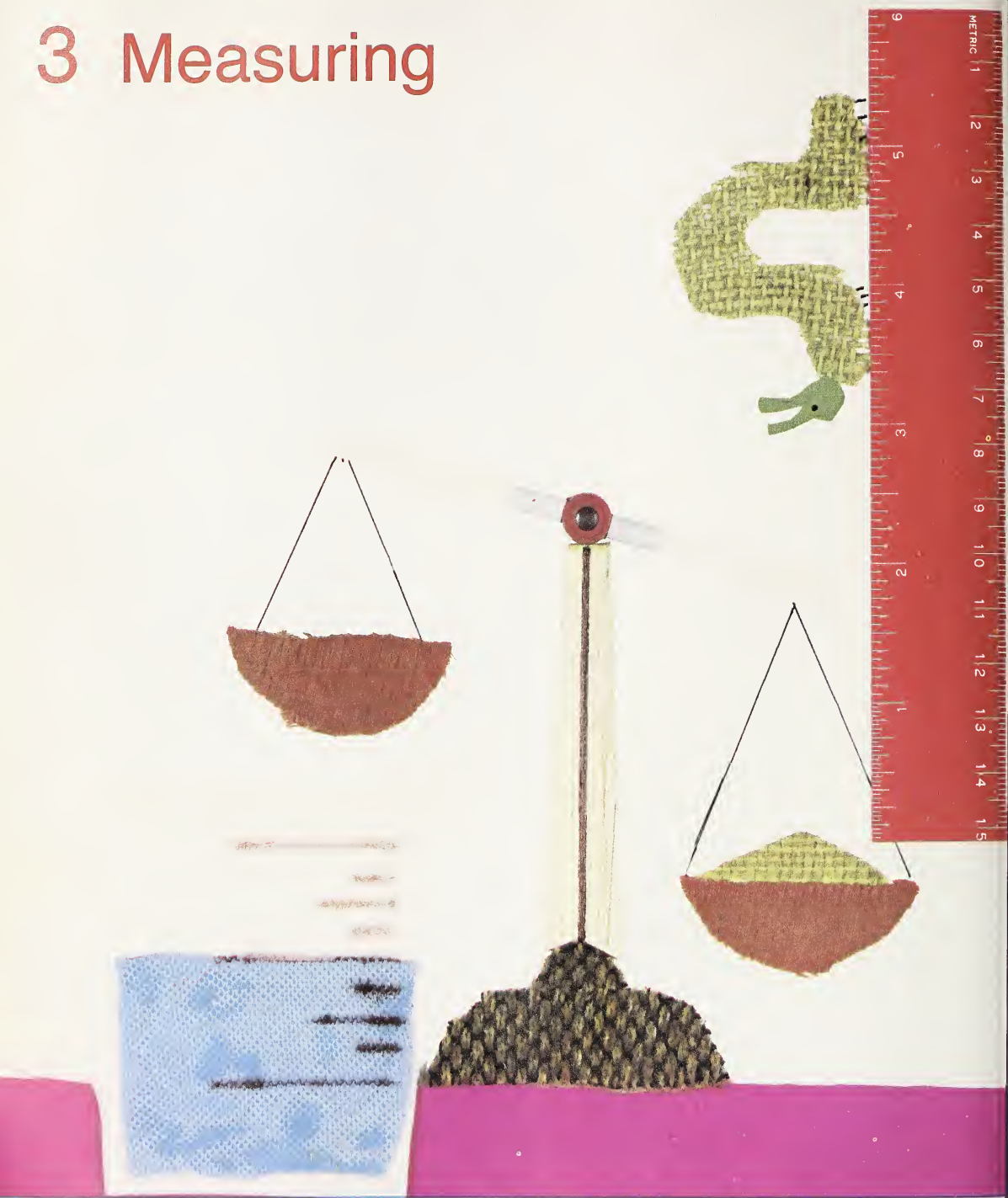
**Sample answers to "Questions to Answer":** 1. Everything around me. 2. People, buildings, animals, plants, places to play, air, water, food, weather. 3. Air, water, food, sunlight, people. 4. Air, water,

food, sunlight, people, other animals, weather, sound, plants.

**For further involvement:** You may wish to use "Fun Things to Do" to involve the children in fun activities which reinforce some of the main concepts of the unit "Environment." You may also wish to encourage the children to make up additional activities related to this unit.



# 3 Measuring



**Preparing for the unit:** For a list of instructional materials helpful in teaching this unit, see pages T11-T12 of the Teacher's Manual. These instructional materials include general references for the teacher, books for children, and filmed or recorded materials. You may also wish to check

the list of materials needed for each "Finding Out" activity in this unit and have the children begin collecting these materials. The list of materials for each "Finding Out" activity is given under "Teaching helps for Finding Out" on pages 68, 72, 75, 77, 79, 81, 83, 85, 88, and 92.



Why couldn't the children push the elephant through the doorway?<sup>1</sup>

How could the children have made sure it would go through?<sup>2</sup>

**Introducing the unit:** You may wish to have the children look at the cartoon above. Then have the children read the questions below the cartoon and discuss their answers to the questions.

**Sample answers for questions below the cartoon:**

<sup>1</sup> Because it was too big.

<sup>2</sup> They could have measured it as they made it to make sure it would go through the door.



## Measuring things

How can the children find out how tall they are?<sup>1</sup>

How can they find out how heavy something is?<sup>2</sup>



### Main concept of the lesson (pages 66–69):

You can find out many things about something by measuring it.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—explain that they can find out how tall and how heavy some things are and how much some things hold by measuring them.

**Important words:** tall, heavy, measure.

<sup>1</sup> Sample answer: By measuring.

<sup>2</sup> Sample answer: By measuring.

How can the boy find out  
how much water the jar holds?<sup>1</sup>

When would you want to measure  
something?<sup>2</sup>



**Suggested discussion:** After discussing "Measuring things," you may wish to ask the children these questions: Have you ever seen people measuring things? If so, why do you think they were measuring them? (Sample answers: Yes. When my parents were cooking, I saw them measure milk,

flour, and other things. They measured the things so that there would be just enough of these things to make the food taste good.)

<sup>1</sup> **Sample answer:** By measuring.

<sup>2</sup> **Sample answer:** When I wanted to find out how big it was or how much of something it held.



# FINDING OUT

- Find out how many paper clips long a small box is.



68

## Teaching helps for "Finding Out":

*Materials needed.* small box, about 100 paper clips, hanger, string

*Processes used:* using numbers, measuring.

*Sample findings.* The length, the volume, and the weight of the box will depend on the box used.

*Extending the 'Finding Out'.* At this time, you

may wish to ask the children to think of some other things that they might use to measure the volume and the weight of the box. Such things might include coins and marbles. You might then wish to have the children measure the volume and the weight of the box with the things they mentioned. You may also wish to help the children



- Find out how many paper clips it can hold.



- Find out how many paper clips it weighs.

How long is the box?  
How much can it hold?  
How heavy is it?

measure something with a piece of string. First, show them how to line up one end of the string with the end of a table and put their finger at the other end of the string. Then have them move the string to the other side of their finger, with one end lined up with their finger. Have them

repeat these steps until one end of the string reaches the other end of the table. Make sure that they count the number of times the string can be laid end to end across the table. You might then have the children use the string to find out the length of some other things.



## Measuring length



### Main concept of the lesson (pages 70–73):

You can find out how long something is by measuring.

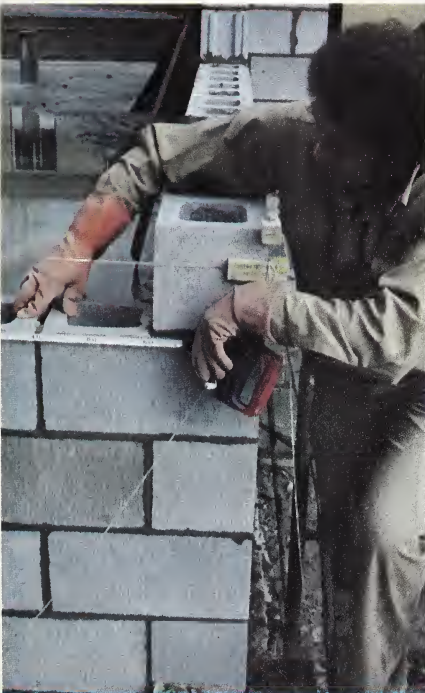
**Performance objective:** After studying the information provided in this lesson, the children should be able to

—demonstrate how to find the length of something.

**Important words:** measuring, measure, length.

**Suggested activity and discussion:** After discuss-

ing the material on pages 70 and 71, you may wish to involve the children in an activity which would help them understand the meaning of the words *length*, *width*, *height*, and *depth*. You might first explain the meaning of these words and then have the children use a piece of string to measure the length, the width, the height, and the depth of some large boxes. You may then want to ask the children this question: Why would someone want to know the length, the width,



What are these people measuring?  
Why?<sup>1</sup>

What things would you want  
to measure the length of?<sup>2</sup>

the height, and the depth of something? (Sample answer: So that that person knew if the thing would fit into a room or truck and how much of something else the thing would hold.)

<sup>1</sup> **Sample answers:** A desk to find out how high it is. Some cloth to find out if it is the length it

should be before it is sewn to another piece of cloth to make clothing. The space between some boards to be sure it is the length it should be in a new building. A pipe to be sure it is the length it should be before using it to build something.

<sup>2</sup> **Sample answer:** My bicycle, classroom, books.



# FINDING OUT

- Have about 5 people measure a room with their feet.



## Teaching helps for "Finding Out":

*Materials needed:* about 5 metre sticks.

*Processes used:* measuring, using numbers, observing, inferring, comparing.

*Sample findings:* After the people measure the

room with their feet, the children will most likely find that almost every person will give a different number for the length of the room. After the people measure the room with measuring sticks, the children will probably find that almost every person will give the same number for the length

- Have the people measure the room with measuring sticks that are the same length.



About how many “feet” long is the room?

About how many measuring sticks long is the room?

Do you think a measuring stick is important? Why?

of the room. From these findings, the children may infer that using a measuring stick is more reliable and consistent than using people’s feet because the size of feet varies from person to person.

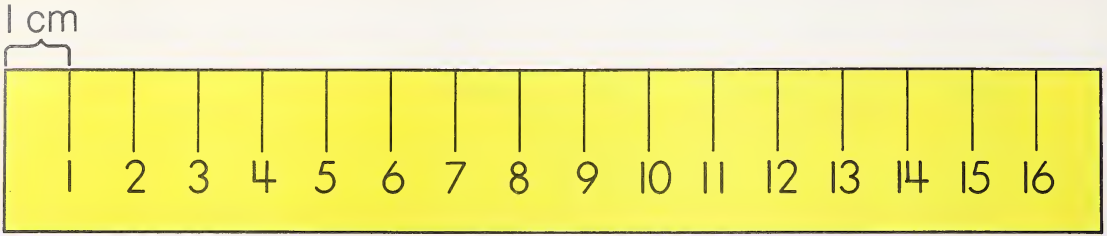
*Extending the “Finding Out”:* At this time, you

may wish to ask the children this question: What do you think would happen if there were no measuring sticks? (Sample answer: People would have different numbers for the length of the same things. Things such as buildings would probably not be built the way that they should be built.)



# Centimetres

The symbol for centimetre is cm. One centimetre = 1 cm.



What are these children finding out by measuring in centimetres?<sup>1</sup>

What would you want to measure in centimetres? Why?<sup>2</sup>

## Main concept of the lesson (pages 74–75):

People sometimes use centimetres to measure the length of some things.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—show how to measure things in centimetres.

**Important word:** centimetre.

**Suggested activity:** After discussing the material on page 74, you may wish to point out to the

children that centimetres are units of measure found on some measuring sticks. And because the centimetres are very small, people use them to measure small things. You might then want to have the children make one centimetre out of paper and have them use the centimetre to measure some small things.

<sup>1</sup> **Sample answer:** How long the bird's nest and the dresser are.

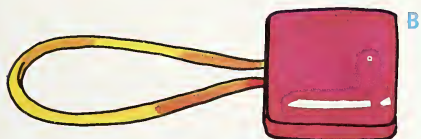
<sup>2</sup> **Sample answers:** Small toys, boxes of cereal.

# FINDING OUT

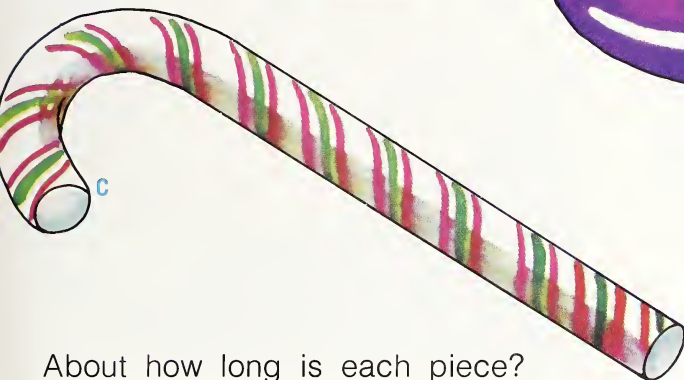
- Draw lines on a piece of paper to show centimetres.
- Use the picture on page 74 to help you.
- Measure how long the candy is.



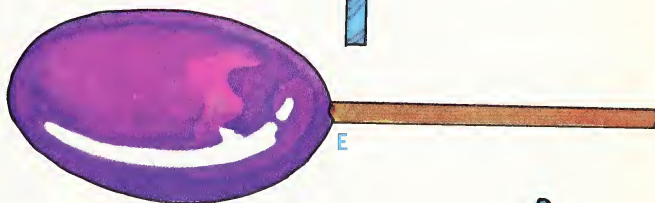
A



B



C



E



F



D

About how long is each piece?  
About how wide is each piece?

## Teaching helps for "Finding Out":

*Materials needed:* paper, pencil, scissors.

*Processes used:* using numbers, measuring.

*Sample findings:* A is 10 cm long, 1 cm wide; B is 2 cm long, 6 cm long including the stick, 2 cm wide; C is 11 cm long, 1 cm wide at the bottom, 4 cm wide at the top; D is 5 cm long, 9 cm long including the stick, 5 cm wide; E is 5

cm long, 10 cm long including the stick, 3 cm wide; F is 7 cm long, 11 cm long including the stick, 8 cm wide.

**Suggested discussion:** You may now wish to ask the children if they would rather measure things with many centimetres hooked together on a measuring stick or with just one centimetre and why. (Sample answers: Many centimetres. Because they are easier to use.)



## Practice using centimetres

Try the following activities to practise measuring in centimetres.



What are these children finding out?<sup>1</sup>  
Measure things around your home  
in centimetres.

### Main concept of the lesson (pages 76-77):

Children practise the lesson learned on pages 74 and 75, and apply their knowledge outside the classroom.

**Performance objectives:** After completing this lesson, the children should be able to

—name things that can be measured in centimetres,

—demonstrate how to measure something in centimetres.

**Teaching helps for the lesson:** If your students suggest that large objects be measured in centimetres, e.g. the width of a room, encourage them to confine their measuring in centimetres to small objects, such as toys and books.

<sup>1</sup> **Sample answer:** How long they are.

## FINDING OUT



- Guess how many centimetres tall the clown is.
- Measure him!

About how many centimetres tall is the clown?

### Teaching helps for "Finding Out":

*Materials needed:* paper, pencil, scissors.

*Processes used:* using numbers, predicting, measuring.

*Sample finding:* The children will most likely find that the clown is about 20 cm tall.

**Suggested activity:** After discussing the lesson on pages 74 and 75, you may wish to involve the

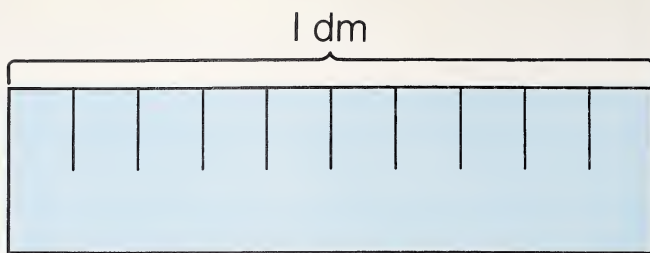
children in an activity which would help them measure other objects in centimetres. You might show the children how to wrap string once around their wrist and then have them measure the string to find out how many centimetres their wrists are. Then have the children measure other things with the string and the centimetre ruler.



## Decimetres

The symbol for decimetre is dm.

One decimetre = 1 dm



Ten centimetres make up a decimetre.

What would you want to measure in decimetres?<sup>1</sup>

78

### Main concept of the lesson (pages 78-79):

People sometimes use decimetres to measure the length of some things.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—demonstrate how to measure something in decimetres.

**Important word:** decimetre.

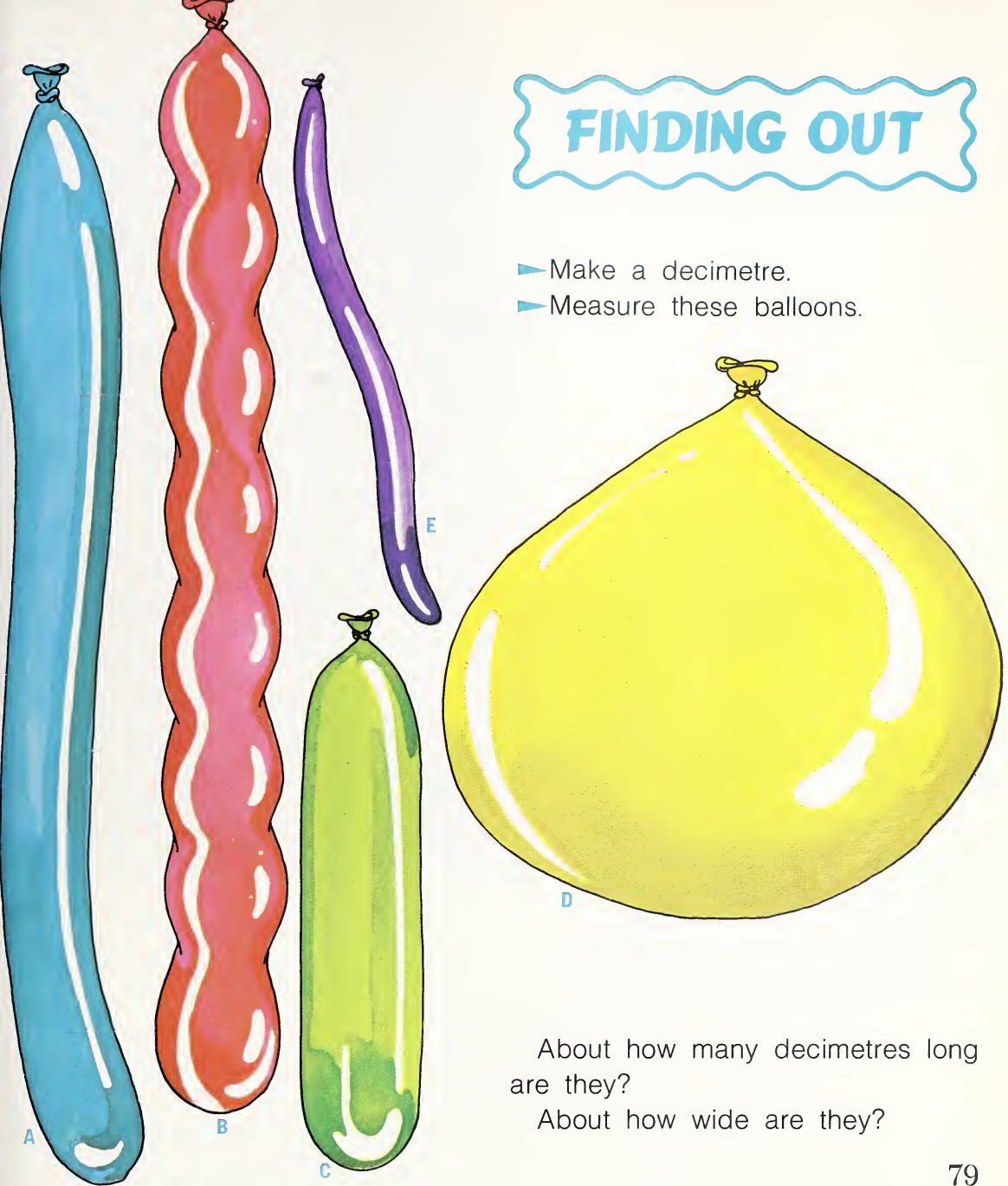
**Suggested discussion:** Before discussing the

material on this page, you might want to ask the children this question: In what ways are the things being measured in the picture above different from the things being measured in the pictures on page 74? (Sample answer: They are bigger.) You may then wish to explain to the children that decimetres are units of measure which are easier to use to measure big things than small units such as centimetres.

<sup>1</sup> **Sample answer:** My desk, big toys, big books.

## FINDING OUT

- ▶ Make a decimetre.
- ▶ Measure these balloons.



About how many decimetres long are they?

About how wide are they?

### Teachings helps for "Finding Out":

*Materials used:* paper, pencil, scissors.

*Processes used:* using numbers, measuring.

*Sample findings:* The children will most likely find that A and B are about 2 dm long, 2 cm wide; C is about 1 dm long, 2 cm wide; D is about 1 dm long, 1 dm wide; E is about 1 dm long, 1 cm wide.

*Additional information:* Though decimetres are part of the metric system, these units are used

less often than centimetres and metres.

*Extending the "Finding Out":* At this time, you may wish to have the children use their decimetre to measure the length or height of some large things such as a large desk or a doorway. Then you might have the children measure these things again in centimetres to help them understand why large units are helpful when measuring large objects.



## Practice using decimetres



Try the following activities to practise measuring in decimetres.

Measure things in the playground in decimetres.

### Main concept of the lesson (pages 80-81):

Children practise the lesson learned on pages 78 and 79, and apply their knowledge outside the classroom.

**Performance objectives:** After completing this lesson, the children should be able to

- name some things that can be measured in decimetres,
- show how to measure something in decimetres.

## FINDING OUT



Measure things in your school  
in decimetres and centimetres.

- ▶ Guess how many decimetres long something is.
- ▶ Measure it.



### Teaching helps for "Finding Out":

*Materials needed:* paper or cardboard, pencil, scissors, decimetre ruler from the "Finding Out" on page 79.

*Processes used:* using numbers, predicting, measuring.

*Sample findings:* The children will probably find that their guesses are different from their findings

after they measure. The children's findings will most likely vary depending upon what each child measures.

*Extending the "Finding Out":* At this time, you may wish to have the children measure the length and the width of some other things and report their findings in decimetres.



# Metres

The symbol for metre is m.

One metre = 1 m

Ten decimetres make up a metre.

What would you want to measure in metres?<sup>1</sup>



**Main concept of the lesson (pages 82-83):**

People sometimes use metres to measure some things.

**Performance objectives:** After studying the information provided in this lesson, the children should be able to

—name some things which can be measured in metres;

—show how to measure some things in metres.

**Important word:** metre.

<sup>1</sup> **Sample answer:** Very big things such as rooms and hallways.



## FINDING OUT

► Make a metre.



► Measure how long something is in metres.

About how many metres long is the thing you measured?

### Teaching helps for "Finding Out":

*Materials needed:* paper or cardboard, pencils, scissors, centimetre ruler from the "Finding Out" on page 75.

*Processes used:* using numbers, measuring, communicating.

*Sample findings:* The findings will vary according to what the children measure.

*Extending the "Finding Out":* At this time, you may wish to point out to the children that to give exact measurements, they may put metres and centimetres together (10 m; 6 cm).



## Practice using metres



Measure things in the playground  
in metres.

84

### Main concept of the lesson (pages 84-85):

Children practise the lesson learned on pages 82 and 83, and apply their knowledge outside the classroom.

**Performance objectives:** After completing this lesson, the children should be able to

- name things that can be measured in metres;
- demonstrate how to measure something in metres.

**Teaching helps for the lesson:** This practice will provide you with an opportunity to reinforce the fact that linear measurement applies equally to vertical as well as horizontal measurement.

# FINDING OUT

- Guess how many metres long something is.
- Measure it.



How close was your guess?

85

## Teaching helps for "Finding Out":

*Materials needed:* paper or cardboard, pencil, scissors, metre stick from the "Finding Out" on page 83.

*Processes used:* predicting, using numbers, measuring.

*Sample findings:* The children will most likely

find that their guess was very different from their finding after measuring.

*Extending the "Finding Out":* At this time, you may wish to have the children guess the length, the width, or the height of some other things and measure them in metres.



## Measuring how much



86

### **Main concept of the lesson (pages 86–89):**

Sometimes people measure how much of something to use.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—list some situations in which people might measure how much of something to use.

**Important word:** measure.

**Suggested activity:** After discussing the material

on pages 86 and 87, you may wish to point out that the litre is a unit of measure used to find out how much of something to use. You might then want to have the children bring from home measuring cups and some cans, jars, and bottles of food. Then help the children find out what units of measure are used to find out how much of something to use by reading the labels on the objects brought by the children.



Sometimes people measure  
how much of something to use.

When would you want to measure  
how much of something to use?<sup>1</sup>

87

**Suggested activity:** After discussing the material on pages 86 and 87, you might want to have the children look in magazines to find pictures of people measuring how much of something to use.

Then the children might use the pictures to make a bulletin-board display about measuring.

<sup>1</sup> **Sample answer:** When I wanted to make something to eat so that it would taste good.



## FINDING OUT



- Empty an orange juice can into a large jar.

- Fill the can with water and empty it into the jar.
- Do this three times.



### Teaching helps for "Finding Out":

*Materials needed:* can of frozen orange juice concentrate, large jar, spoon, glass.

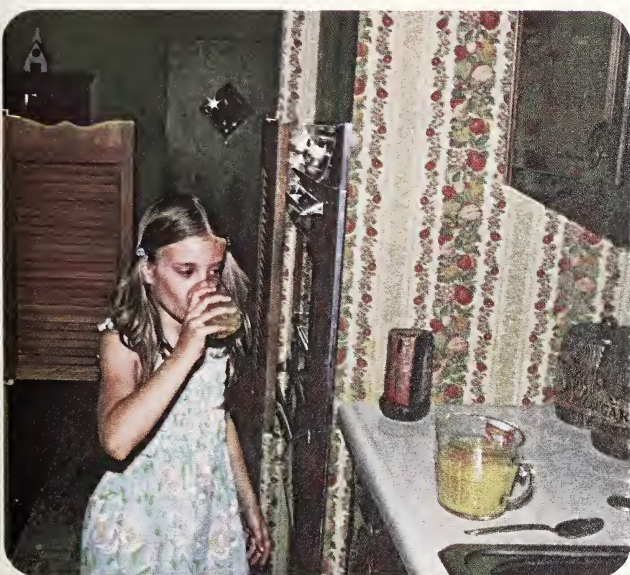
*Processes used:* measuring, observing, inferring.

*Sample findings:* The children will most likely

find that the juice tasted good. From this they may infer that measuring was important because if they had not measured correctly, the juice might not have tasted good.



► Stir the orange juice.



► Taste the juice.

Was measuring important in making the juice? Why?

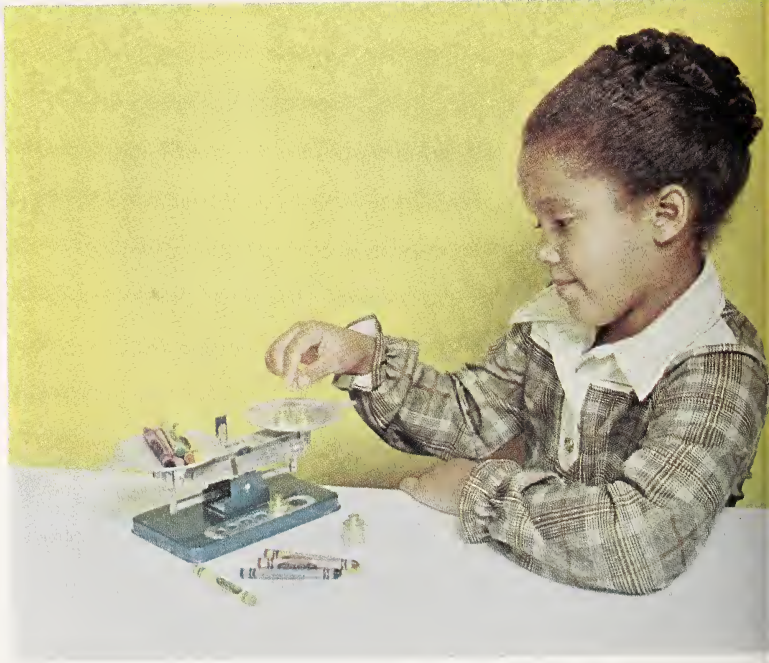
89

**Suggested activity:** After the children complete the "Finding Out," you may wish to involve them in another activity. First have the children look at several large jars of different shapes and a

small jar such as a baby-food jar. Then have the children guess how many small jarfuls of water or rice will fit into each large jar. The children may then try to find the answer.



## Measuring how heavy



90

### Main concept of the lesson (pages 90–93):

Sometimes people measure how heavy things are.  
**Performance objectives:** After studying the information provided in this lesson, the children should be able to

- list some things people might want to measure to find out their mass;
- measure how heavy some things are.

**Important word:** heavy.

**Suggested activity:** After discussing the material

on this page, you may wish to involve the children in an activity which would help them discover more about measuring mass. Have the children bring to class boxes and cans of food. Then you might want to help the children read the labels to find out the mass of each box and can. If you have access to a scale that registers grams, you might want to help the children find the mass of each item to see that it is correctly labeled.

Sometimes people measure how heavy things are.

When would you want to measure how heavy something is?<sup>1</sup>



<sup>1</sup> Sample answer: When I wanted to know if I could lift it.



# FINDING OUT

- Find out how heavy you are.
- Guess how heavy some other things are.



## Teaching helps for "Finding Out":

*Materials needed:* scale; objects such as book, pan, rock, rubber ball, and brick.

*Processes used:* predicting, classifying, using numbers, measuring.

*Extending the "Finding Out":* At this time, you may want to ask the children these questions: Did you put the things in the row in the right

order? Why or why not? Were the things with the brightest colour the heaviest? Why or why not? (Sample answers: No. Because I thought the biggest thing was the heaviest thing. But it was made of something lighter than the heaviest thing was. No. Because colours do not make things heavy.)

- ▶ Put them in a row with the thing you think is heaviest first.
- ▶ Find out how heavy these things are.



How heavy are you?<sup>1</sup>

How heavy are the other things?<sup>2</sup>

<sup>1</sup> Sample answer: The answers will vary with each child.

<sup>2</sup> Sample answer: The answers will vary depending on the objects used.

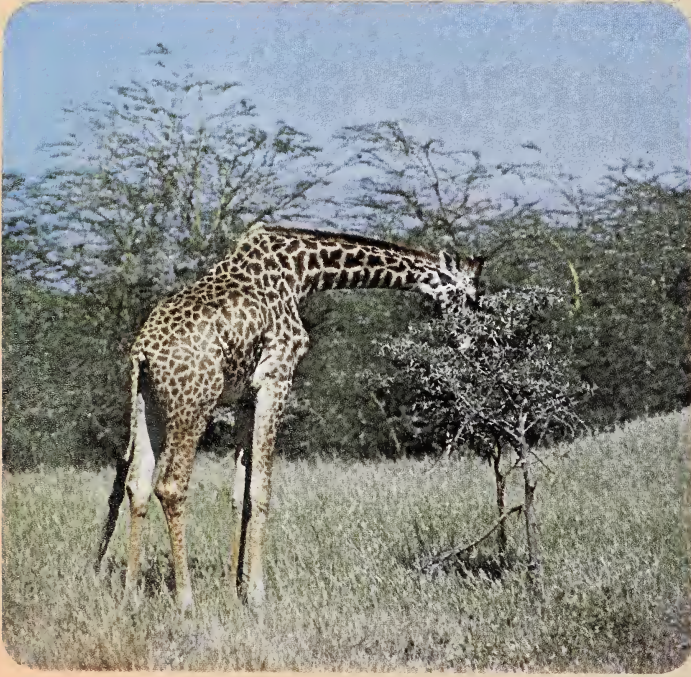


## Words to Know

measuring  
centimetres  
decimetres

metres  
measure  
length

## Picture to Think About



What would you use to measure  
how tall this animal is? Why?

**Reviewing the important words:** You may wish to use the words under "Words to Know" to help the children review the important words in this unit.

**Applying knowledge:** You may wish to encourage the children to apply the knowledge they have gained about some of the concepts in this unit. Have the children look at the picture under

"Picture to Think About." Then have them read the questions under the picture and discuss their answers to the questions.

**Sample answers for "Picture to Think About":**  
A metre stick. Because the giraffe is very tall.

## Questions to Answer

1. What can you find out by measuring something?
2. When would you measure something in centimetres?
3. When would you measure something in metres?
4. When would someone measure how much of something to use?
5. When would someone measure how heavy something is?

## Fun Things to Do

Find out how high a room is.  
Tie a long string to a long stick.  
Touch the top of the room with the stick.  
Mark the string where it hits the floor.  
Measure the string.

Find or draw pictures of people measuring things.

**Suggestion for evaluation:** You may wish to use the questions under "Questions to Answer" to evaluate the children's understanding of the main concepts of the unit.

**Sample answers to "Questions to Answer":** 1. How long, tall, wide, and heavy something is. How much of something something else holds. 2. When I wanted to find out how long or wide something very small was. 3. When I wanted to find out how long or wide something very big was. 4. When they

wanted to make orange juice or some other drink or food. 5. When they wanted to know if they could lift it or if they had lost or gained mass. **For further involvement:** You may wish to use "Fun Things to Do" to involve the children in fun activities which reinforce some of the main concepts of the unit "Measuring". You may also wish to encourage the children to make up additional activities related to this unit.



# 4 Magnets



**Preparing for the unit:** For a list of instructional materials helpful in teaching this unit, see page T12 of the Teacher's Manual. These instructional materials include general references for the teacher, books for children, and filmed or recorded materials. You may also wish to check the

list of materials needed for each "Finding Out" activity in this unit and have the children begin collecting these materials. The list of materials for each "Finding Out" activity is given under "Teaching helps for Finding Out" on pages 102, 108, 111, 113, 116, 119, 121, 123, and 125.



What is a magnet?<sup>1</sup>

When have you used a magnet?<sup>2</sup>

97

**Introducing the unit:** You may wish to have the children look at the cartoon above. Then have the children read the questions below the cartoon and discuss their answers to the questions.

**Sample answers for questions below the cartoon:**

<sup>1</sup> A magnet is a piece of metal which attracts iron.

<sup>2</sup> I have used a magnet in one of my toys.



## Kinds of magnets



**Main concepts of the lesson (pages 98–99):**

There are many kinds of magnets.

Magnets have different shapes and sizes.

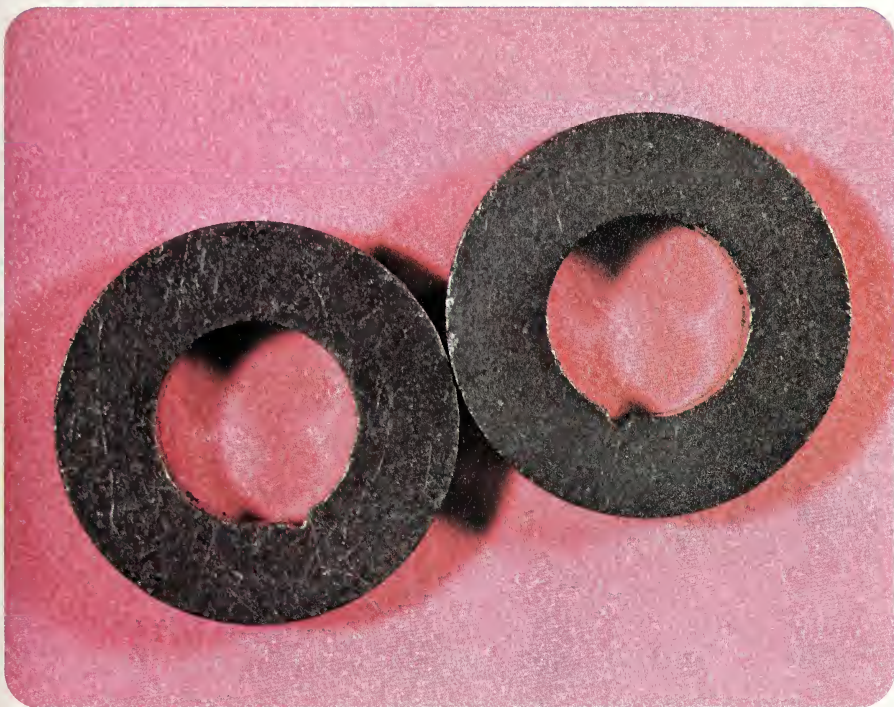
**Performance objective:** After studying the infor-

mation provided in this lesson, the children should be able to

—state that there are many kinds of magnets.

**Important words:** magnets, alike, different.

How are these magnets alike?<sup>1</sup>  
How are they different?<sup>2</sup>  
Which kinds of magnets have you seen?<sup>3</sup>



**Teaching helps for the pictures above:** The magnets pictured on page 98 are a “horseshoe” magnet and a “bar” magnet. The magnets pictured on page 99 are a “cylindrical” magnet and “ring” magnets. The S and the N marked on the magnets stand for the north and the south poles. You may wish to ask the children which magnet looks like a horseshoe or which magnets look like rings.

<sup>1</sup> **Sample answer:** All the magnets are made of the same material and three of them have markings of S and N.

<sup>2</sup> **Sample answer:** The magnets have different shapes and sizes.

<sup>3</sup> **Sample answer:** The most common magnet to children is the “horseshoe” magnet.



## Picking up things with magnets



100

**Main concept of the lesson (pages 101–103):** Magnets can pick up things that have iron in them.

**Performance objectives:** After studying the information provided in this lesson, the children should be able to

- state that magnets can pick up things that have iron in them;
- demonstrate that magnets can pick up things that have iron in them.

**Important words:** magnet, iron, pick up



Magnets can pick up things that have iron in them.

What things are these children picking up with magnets?<sup>1</sup>

**Teaching helps for the picture above:** Magnetic attraction is shown with many different objects in the art above. You may wish to explain to the children that an object does not have to be made out of solid iron for it to be attracted to a magnet. An object may have just a little iron in it. A little iron in an object is enough for it to be picked up

by a magnet. Very few things are made out of solid iron. This is because iron is very heavy. Iron is mixed with other metals because iron is strong.

<sup>1</sup> **Sample answer:** Dog dish, keys, tacks, paper clips, end of a roller skate.



## FINDING OUT

- Put many different things on a table.
- Guess which things your magnet will pick up.



### Teaching helps for "Finding Out":

*Materials needed:* magnets; many, different small objects.

*Processes used:* predicting, classifying, observing.

*Sample findings:* The things which have iron in them will be attracted to the magnet. When the children are guessing which things their magnet will pick up, they may point out things that

► Bring your magnet near each thing.

What happens? Did you guess right?



► Guess about other things that your magnet will pick up.

Did you guess right? Why?

are made of metal but do not have iron in them. Some things which are made of tin or aluminum may look like iron. However, the magnetic test will prove which things are actually made of iron.

The children may also discover that some objects are made of iron but are just too heavy to be picked up by the magnet which they are using.



## Magnets sticking to things



Where are the magnets  
in these pictures?<sup>1</sup>

104

**Main concept of the lesson (pages 104–105):** Magnets stick to things which have iron in them.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state and demonstrate that some magnets stick to things which have iron in them.

**Important word:** magnets.

**<sup>1</sup> Sample answer:** On an oven door, a car, and a bicycle.



What are some other things magnets may stick to?<sup>1</sup>



**Suggested research and activity:** After the children look at the pictures on these pages, you may wish to have them find other things in their home or school which magnets may attract. By using a small magnet, each child may test many objects. After their research and findings, the children may want to draw pictures of some of

the things that their magnet stuck to. Some of these pictures may be put on display in the classroom.

<sup>1</sup> **Sample answer:** Stoves, refrigerators, parts of doors and windows, some toys, wagons, parts of desks and chairs.



## Strong and weak magnets



What things can these magnets pick up?<sup>1</sup>

106

**Main concept of the lesson (pages 106–109):** Some magnets are stronger than other magnets.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state and demonstrate that a strong magnet

can pick up things that are heavier than the things that a weak magnet can pick up.

**Important words:** strong, magnet.

<sup>1</sup> **Sample answer:** Lock, nails, paper clips, toy airplane, toy truck.

What things can strong magnets pick up?<sup>1</sup>

What things can magnets that are not so strong pick up?<sup>2</sup>

How are these things different?<sup>3</sup>



<sup>1</sup> **Sample answer:** Large toys with iron in them, heavy keys, bicycle parts, cans, chains.

<sup>2</sup> **Sample answer:** Straight pins, paper clips, tacks, nails, hairpins, safety pins, small iron toys.

<sup>3</sup> **Sample answer:** A strong magnet can pick up large, heavy things. A magnet that is not so strong can pick up small, light things.



## FINDING OUT

- ▶ Collect different kinds of magnets.
- ▶ Put different things with iron in them on a table.
- ▶ Test your magnets.



108

### Teaching helps for "Finding Out":

*Materials needed:* different size and different strength magnets, things made with iron which vary in size and weight.

*Processes used:* observing, comparing, classifying, inferring.

*Sample findings:* The children will discover that some magnets can pick up only those things that are small and light in weight. They will also dis-

cover that some magnets can pick up many small objects as well as some large, heavy objects. *Additional information:* You may wish to point out to the children that a large object need not always be picked up by a strong magnet. This is because some large objects may be light in weight. You may wish to emphasize that a strong magnet shows its strength by being able to pick up heavy objects.



Which magnets are strong?  
How can you tell?<sup>1</sup>

Which magnets are not strong?  
How can you tell?<sup>2</sup>

109

<sup>1</sup> *Sample answer:* The strong magnets pick up the large, heavy objects.

<sup>2</sup> *Sample answer:* The magnets that are not strong can pick up only small, lightweight objects. *Extending the "Finding Out":* If there is a rather large or heavy object in the collection, the chil-

dren may discover that the strongest magnet cannot pick it up. Then, you might suggest that five or six of the children could join together to see if the combined forces of their magnets can pick up the object.



## Strong parts of magnets



Where are the strong parts of this magnet? How do you know?

110

**Main concept of the lesson (pages 110–111):** Some parts of a magnet are stronger than other parts.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—identify the strong parts of a magnet.

**Important words:** magnet, strong, parts.

**Teaching helps for the picture above:** The magnet

pictured on this page was placed in a pile of tacks. The tacks were attracted to the poles of the magnet because the poles of a magnet have a greater magnetic force than the area between the poles. Magnets which have poles (bar, horseshoe, and cylindrical magnets) will have more strength at their ends than a magnet that has no poles. A ring magnet is a magnet with no set poles.

## FINDING OUT

- Place small things with iron in them on a table.
- Put a magnet near these things.



Where are the strong parts  
of your magnet?

111

### Teaching helps for "Finding Out":

*Materials needed:* magnets, small objects made with iron.

*Processes used:* observing, comparing.

*Sample findings:* If a magnet is placed in a cluster of small iron objects, these objects will stick to the ends of the magnet.

*Extending the "Finding Out":* Another way to test the strong parts of a magnet is to compare the strength of their magnetic pull with one object. For example, a fairly heavy object may be picked up by one end of a magnet but cannot be picked up by the middle area of the same magnet.



## Magnets pulling through things



How are these children pulling things?<sup>1</sup>

112

**Main concept of the lesson (pages 112–113):** Magnets can pull through things.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state and demonstrate that magnets can pull through things.

**Important words:** magnets, pulling.

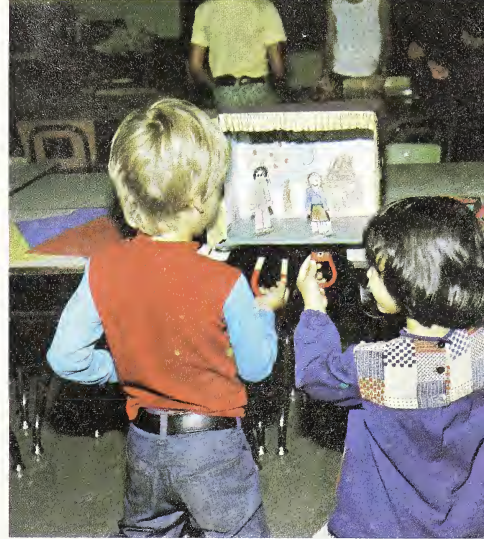
**Teaching helps for the pictures above:** The pic-

ture on the left shows evidence of a magnetic force pulling through a piece of glass. The picture on the right shows evidence of a magnetic force pulling through a piece of cardboard.

<sup>1</sup> **Sample answer:** The car is being pulled across the glass by a magnet held under the glass. The bottle cap is being pulled along the cardboard by a magnet held on the other side of the cardboard.

# FINDING OUT

- ▶ Make a stage and players out of cardboard.
- ▶ Tape your players to small magnets or paper clips.
- ▶ Use a magnet under your stage to make your players move.



In what ways can you make your players move?<sup>1</sup>

113

## Teaching helps for "Finding Out":

*Materials needed:* cardboard, scissors, tape or glue, small magnets or paper clips, crayons, large magnets.

*Process used:* experimenting.

<sup>1</sup> *Sample answer:* By twisting the magnets in various positions, I can make the players turn in circles. By slowly moving the magnets, I can make the players move across the stage. By jerking the magnets, I can make the players fall.

*Additional information:* A thin stage will provide an easy motion of the players. A stage made of a large aluminum cookie sheet will show the best results.

*Extending the "Finding Out":* The children may wish to test their magnets with objects through plastic, paper, leaves, aluminum foil, rubber, or clothing. The children may then discover that a magnetic force pulls through most *thin* substances.



## Uses of magnets



Find the magnets in these pictures.<sup>1</sup>

**Main concept of the lesson (pages 114–117):** There are many uses of magnets.

**Performance objective:** After studying the information provided in this lesson the children should be able to

—state some of the uses of magnets.

**Important words:** magnets, uses.

<sup>1</sup> **Sample findings:** The lid of the can is held by a magnet on the can opener. The numbers on the magnetic board are held by magnets. The magnetic face of the Etch A Sketch® holds the iron filings until they are rubbed off by the dials. The pot holder is held to the stove by the magnet sewn in the loop hook.



How are these magnets being used?<sup>1</sup>



115

**Sample answer:** The magnet on the can opener separates the lid from the can. (This prevents having to remove the lid from inside the can.) The magnetic numbers make it easy to move the numbers to set up different math problems. The

Etch A Sketch<sup>®</sup> is a magnetic toy used for drawing. The magnet in the pot holder makes cooking easy because the pot holder is kept at a handy spot on the stove.



## FINDING OUT

- Draw a picture on a small piece of cardboard.
- Colour your picture.
- Paste a small magnet to the back of your picture.



What things will your  
“picture magnet” hold up?

116

### Teaching helps for “Finding Out”:

*Materials needed:* paper, scissors, crayons, glue or tape, magnet.

*Process used:* experimenting.

*Sample findings:* The newly made magnets will hold up most notes on paper. They can also hold up pieces of material, thin plastic, or aluminum-foil designs.

*Extending the “Finding Out”:* The children may wish to make magnet designs out of things other than cardboard. You might encourage the children to glue or tape magnets to their favourite things to be used as a design. Small wood carvings, real flowers, photographs, or their initials on cardboard might be suggested for their picture magnets.

# FINDING OUT

- Find magnets in your home.
- Find magnets in your school.



How are these magnets used?<sup>1</sup>

117

## Teaching helps for "Finding Out":

*Materials needed:* none.

*Processes used:* observing, classifying.

<sup>1</sup> *Sample answer:* The magnet pictured on the left is used to hold up a note on a locker door. The magnet pictured on the right is used to keep the cabinet door securely closed.

*Extending the "Finding Out":* You may wish to

tell the children that the magnets that they find in their home or school have been made by people. Some magnets, however, can be found in the ground. These "natural magnets" are called lodestones. Lodestones look like most other rocks in the earth but they stick to iron. The scientific word for a lodestone is magnetite. It is from this word that a magnet gets its name.



## Magnets sticking together

What do these pictures show about magnets?<sup>1</sup>



118

**Main concept of the lesson (pages 118–119):** Magnets can stick to other magnets.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—show that magnets stick together.

**Important words:** magnets, together.

**Teaching helps for the pictures above:** The boys pictured on the left have found that their magnets stick together. The girl pictured on the right has

found that one magnet can be held by the force of the other magnet.

**Suggested activity:** The children may wish to make their magnets stick to other magnets. If the magnets in your classroom show the north and the south poles, the children may discover that the unlike poles will attract. A north pole of one magnet will stick to the south pole of another magnet.

<sup>1</sup> **Sample answer:** Magnets can stick together.

## FINDING OUT



- ▶ Make a frog as shown.
- ▶ Tape a magnet to your frog.
- ▶ Hold another magnet near your frog.

How high can your frog jump?

119

### Teaching helps for "Finding Out":

*Materials needed:* tracing paper or other thin paper, magnets, tape or glue, crayons, scissors.

*Processes used:* observing, experimenting.

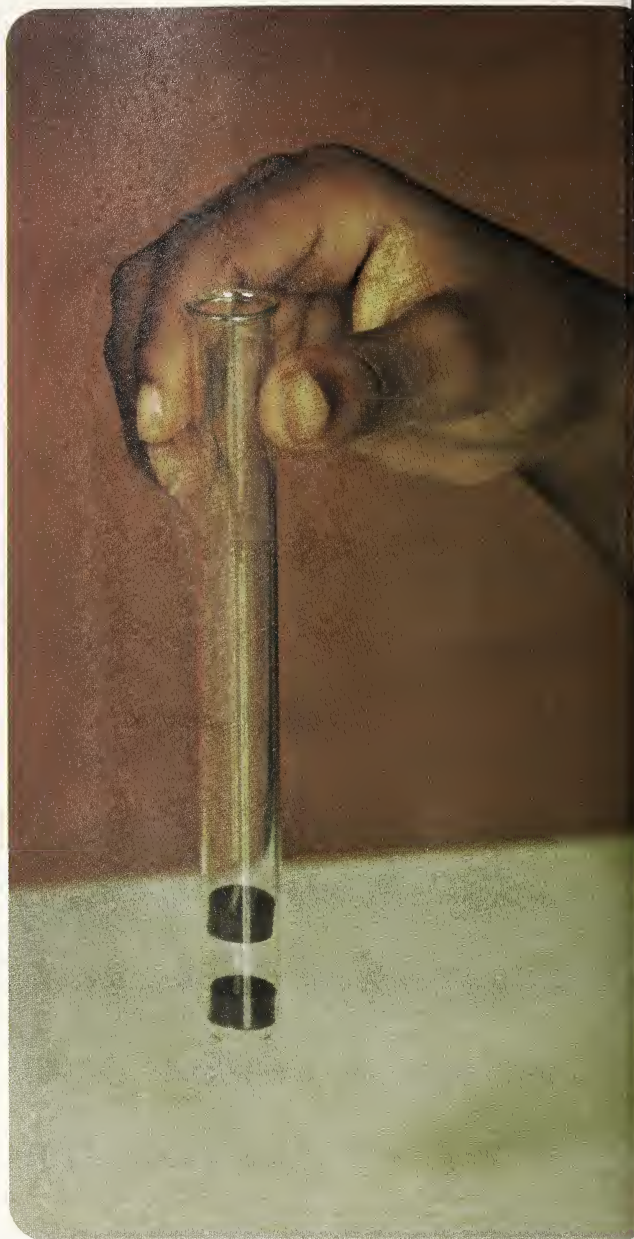
*Sample findings:* Depending on the strength of the magnets, the children will discover that their "frog magnet" will stick to their "jumping magnet" at different heights.

*Additional information:* You may wish to make a cardboard pattern of the frog to help the children trace and make their own. When the children are taping the magnets to their frogs, you might tell them to leave some of the magnet uncovered. A large amount of tape over the magnet will decrease its strength.



## Magnets pushing away

What does this picture  
show about magnets? <sup>1</sup>



120

**Main concept of the lesson (pages 120–121):**

Magnets can push away from other magnets.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—show that magnets can push away from other magnets.

**Important words:** magnet, pushing.

**Teaching helps for the picture above:** Two magnets have been placed in the glass tube. One

magnet is resting at the bottom of the tube. The other magnet is being suspended in the air by the pushing force of the bottom magnet.

**Suggested activity:** The children may wish to make their magnets push away from other magnets. If the magnets in your classroom show the north and the south poles, the children may discover that like poles will repel.

**Sample answer:** Magnets can push away from other magnets.

# FINDING OUT



- ▶ Make a car as shown.
- ▶ Tape a magnet to your car.
- ▶ Make your car move by pushing it away with another magnet.

How far can you move your car without touching it?

121

## Teaching helps for "Finding Out":

*Materials needed:* tracing paper or other thin paper, scissors, tape or glue, magnets, crayons.  
*Processes used:* predicting, observing, experimenting.

*Sample findings:* The children will discover that they must be sure that the correct magnet end be pointing toward their car. Each car will move away in a jerking motion at first. With a little

practice, the children will be able to move their car smoothly without touching it along a table-top or floor.

*Additional information:* It will not be unusual for the cars to spin around and stick to their "pushing magnet." For this reason, the children may wish to build a grooved "track" to keep the cars moving in a forward motion.



## Making magnets



These children are making things into magnets.

What can they pick up with the magnets they are making?<sup>1</sup>

**Main concept of the lesson (pages 122–123):** Iron objects can be made into magnets.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state and demonstrate that iron objects can be made into magnets.

**Important word:** magnets

**Teaching helps for the picture above:** The children pictured above are stroking keys and a nail with magnets. This stroking causes other objects to become magnetized. Because of this, keys and nails (or other iron objects) can be made into magnets.

<sup>1</sup> **Sample answer:** Tacks, paper clips, and any lightweight iron objects.

## FINDING OUT

- ▶ Stroke some scissors with one end of a magnet.
- ▶ Stroke one way, not back and forth.



- ▶ Bring your scissors close to some small iron things.

What happens?

- ▶ Try making other things into magnets.

What things can you pick up with these magnets?



123

### Teaching helps for "Finding Out":

*Materials needed:* scissors, magnet, small iron objects.

*Processes used:* observing, experimenting.

*Sample findings:* After the children stroke the scissors with a magnet, the children will be able to pick up small iron things such as pins, tacks, paper clips, or needles.

*Additional information:* It is important that the children stroke one way with their magnet. (Back-and-forth rubbing will reverse the poles and neutralize the object.) If the children stroke firmly, they will be able to make their new magnets strong. Other suggested objects to be used may be nails, paper clips, or keys.



## Chains of magnets



What are these children doing with their magnets?<sup>1</sup>

Why do you think these things are sticking together?<sup>2</sup>

124

**Main concept of the lesson (pages 124–125):** The force of a magnet can pull through iron objects.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state and demonstrate that the force of a magnet can pull through iron objects.

**Important word:** magnets.

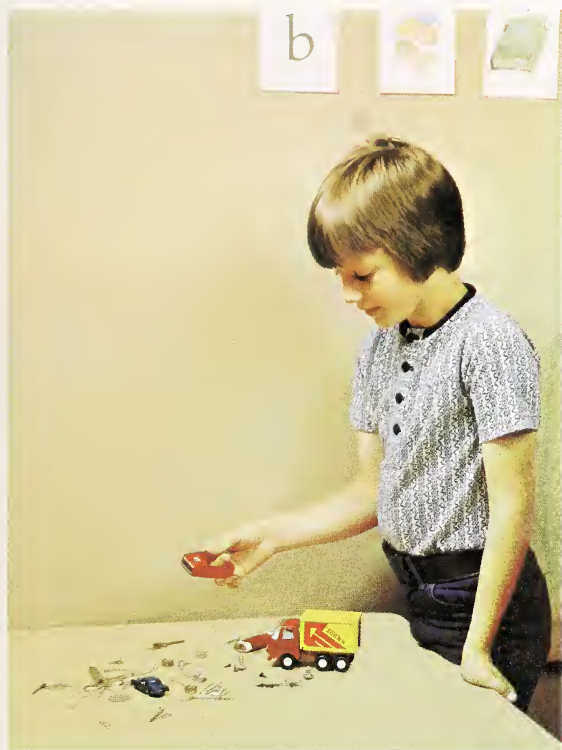
**Teaching helps for the picture above:** The children

pictured above are showing that magnetic force is transferred through iron objects. As magnetic force is transferred through an object, it is weakened. For this reason, the chain of objects shows heavy things close to the magnet.

<sup>1</sup> **Sample answer:** They are making a chain of iron objects that are held together by the force of a magnet.

<sup>2</sup> **Sample answer:** The force of a magnet pulls through iron objects.

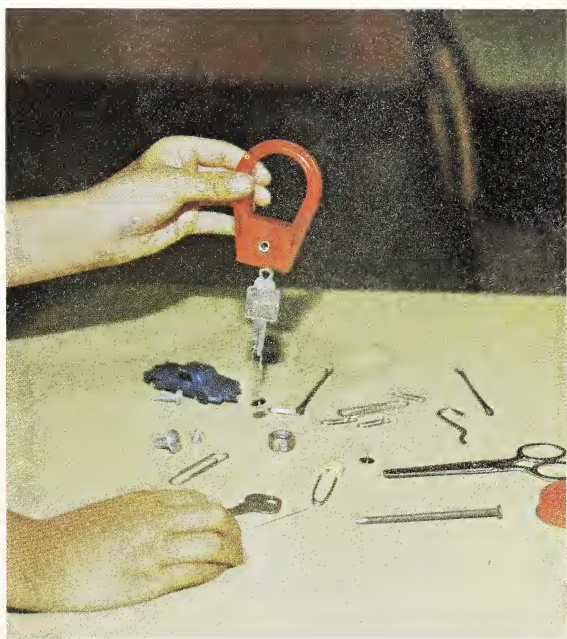
# FINDING OUT



► Collect some small iron things.

- Hold a magnet near these things.
- Make a chain of iron things.

How many different pieces  
stick to your chain?



125

## Teaching helps for "Finding Out":

*Materials needed:* strong magnet, small iron objects.

*Processes used:* observing, experimenting.

*Sample findings:* Depending on the strength of the magnet, the children will find that an assort-

ment of objects will form into a magnetic chain. Heavy objects can be a part of the magnetic chain if they are close to the magnet. The remainder of the chain will consist of lightweight objects.



## Words to Know

magnet  
pulling

iron  
pushing

strong

## Picture to Think About



What is happening  
in this picture? Why?

126

**Reviewing the important words:** You may wish to use the words under “Words to Know” to help the children review the important words in this unit. **Applying knowledge:** You may wish to encourage the children to apply the knowledge they have gained about some of the concepts in this unit. Have the children look at the picture under “Picture to Think About.” Then have them read the

questions next to the picture and discuss their answers to the questions.

**Sample answers for “Picture to Think About”:** The needle and thread are suspended in the air. The thread is taped to the surface of a table. A magnet is pulling the needle from above. The needle is kept from sticking to the magnet because the thread is holding the needle down.

## Questions to Answer

1. What things stick to magnets?
  2. What things do not stick to magnets?
  3. What are some uses of magnets?
- 

## Fun Things to Do

Draw a picture of a face.  
Do not draw any hair.  
Place tiny pieces of iron  
(such as carpet tacks) on the face.  
Hold a magnet under your picture.  
Move the "hair" in place with the magnet.

Write numbers on small pieces of paper.  
Tape the pieces to paper clips.  
Place the paper clips in a box.  
Tie a string to a magnet.  
Go fishing!  
Add up the numbers  
on the "fish" you caught.

**Suggestion for evaluation:** You may wish to use the questions under "Questions to Answer" to evaluate the children's understanding of the main concepts of the unit.

**Sample answers for "Questions to Answer":** 1. Things that are made with iron. 2. Anything that is not made with iron. 3. Magnets may be used in toys or games. Magnets can be used to hold up

notes or pot holders. They can also be used to help keep doors closed.

**For further involvement:** You may wish to use "Fun Things to Do" to involve the children in fun activities which reinforce some of the main concepts of the unit "Magnets." You may also wish to encourage the children to make up additional activities related to this unit.



# 5 The Moon



**Preparing for the unit:** For a list of instructional materials helpful in teaching this unit, see page T12 of the Teacher's Manual. These instructional materials include general references for the teacher, books for children, and filmed or recorded materials. You may also wish to check

the list of materials needed for each "Finding Out" activity in this unit and have the children begin collecting these materials. The list of materials for each "Finding Out" activity is given under "Teaching helps for Finding Out" on pages 133, 140, 142, 145, and 156.





What happened to Sara?<sup>1</sup>

When have you watched the moon?<sup>2</sup>

What things did you see?<sup>3</sup>

**Introducing the unit:** You may wish to have the children look at the cartoon above. Then have the children read the questions below the cartoon and discuss their answers to the questions.

**Sample answers to questions below the cartoon:**  
<sup>1</sup> She was painting a picture of the moon. The first time she started, there was a full moon. Each

night, she discovered that the moon appeared to get smaller and smaller. Finally, almost two weeks later, the moon could not be seen. It was a new moon. <sup>2</sup> Mostly at night and sometimes during the day. <sup>3</sup> The moon moves, it changes shape, it changes colour, and it gets covered by clouds.



## The moon at night



When have you seen the moon look like this?<sup>1</sup>

130

**Main concept of the lesson (page 130):**

The moon may be seen at night.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

— observe and state that the moon may be seen at night.

**Important words:** moon, night.

**Teaching helps for the picture above:** The moon

pictured above is a full moon. The yellowish-orange colour of the moon is seen because of the weather conditions on the night the picture was taken. On some other nights, the moon may appear white, bluish, or gray. The moon appears brighter at night than it does during the day because the night sky is dark.

<sup>1</sup> **Sample answer:** Usually for a couple of nights each month.

## The moon during the day



When have you seen  
the moon look like this?<sup>1</sup>

131

**Main concept of the lesson (page 131):**

The moon may be seen during the day.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—observe and state that the moon may be seen during the day.

**Important words:** moon, day.

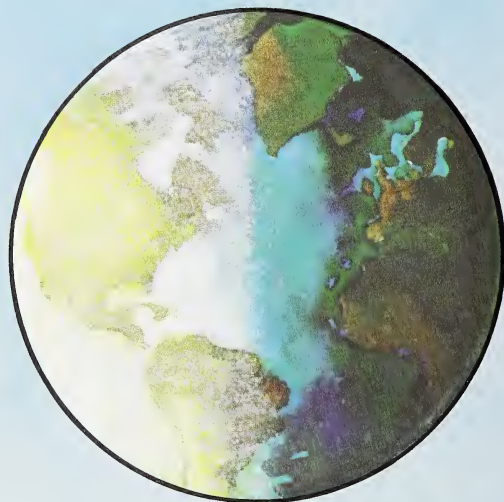
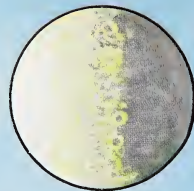
**Teaching helps for the picture above:** The moon

pictured above is a full moon. The moon that is seen during most days appears very light in colour. It may sometimes appear as though it were transparent. Because the day sky is often very bright with the sun's light, the moon may not be seen at all.

<sup>1</sup> **Sample answer:** Usually for a couple of days each month.



# Moonlight



What makes the moon look bright? <sup>1</sup>  
Where is it daytime on the moon? <sup>2</sup>  
Where is it nighttime on the moon? <sup>3</sup>

132

**Main concepts of the lesson (pages 132–133):**  
The moon gets its light from the sun.

There is a daytime and a nighttime on the moon.

**Performance objectives:** After studying the information provided in this lesson, the children should be able to

- state that the moon gets its light from the sun;
- state that there is a daytime on the moon;
- state that there is a nighttime on the moon.

**Important words:** moon, daytime, nighttime.

<sup>1</sup> **Sample answer:** The moon looks bright because the sun's light is bounced off the moon to the earth. •

<sup>2</sup> **Sample answer:** Daytime on the moon is on the bright side which faces the sun.

<sup>3</sup> **Sample answer:** Nighttime on the moon is on the dark side which faces away from the sun.

# FINDING OUT

- Darken the room.
- Shine a light on a ball. Make believe this is the moon.
- Shine the light away from the moon.



When can you see the moon?  
When can you not see the moon?



## Teaching helps for "Finding Out":

*Materials needed:* flashlight, ball.

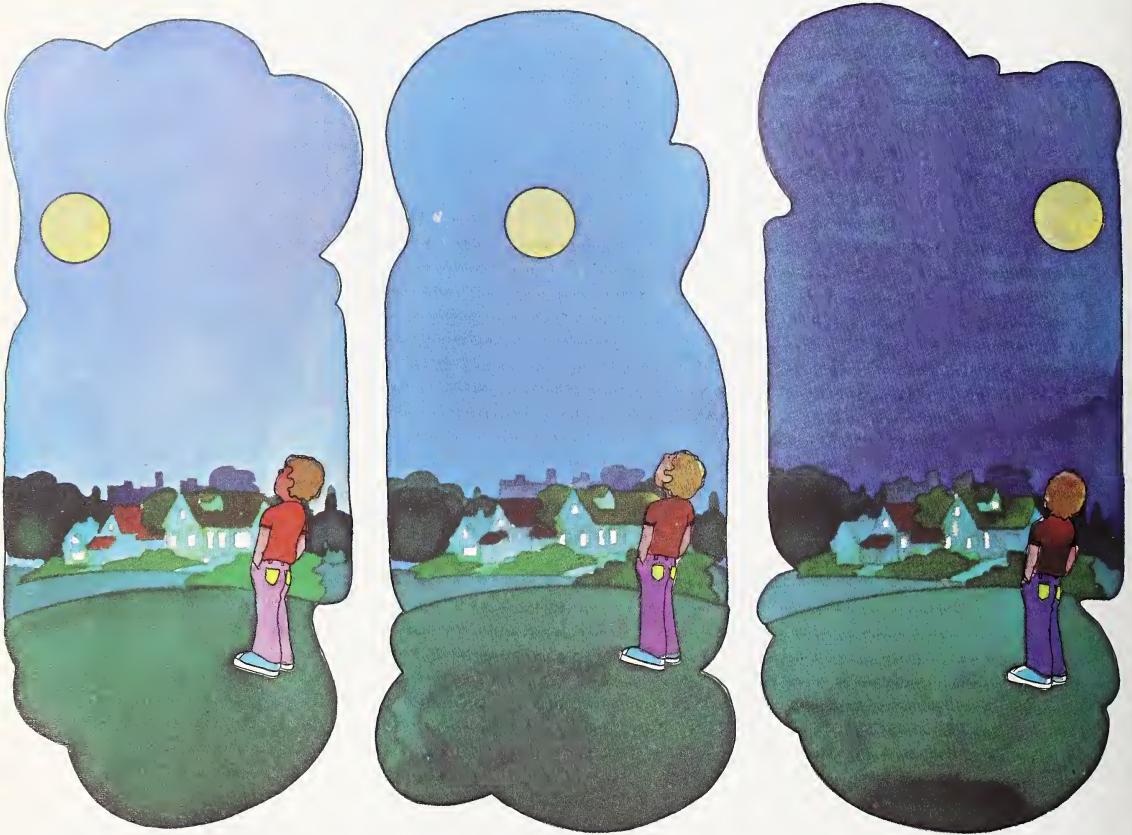
*Processes used:* observing, comparing.

*Sample findings:* When the children shine the light (the sun) on the ball (the moon), the ball can be seen. When the light is not on the ball, the ball cannot be seen.

*Additional information:* The boy shown in the second picture is turning the light away from the ball. This makes the ball less visible. The moon has no light of its own. It can be seen only when the sun's light is on the moon and is reflected to the earth.



## Rising and setting of the moon



Where is the moon  
in each of these pictures?<sup>1</sup>  
At what different places  
have you seen the moon?

134

**Main concept of the lesson (pages 134–135):** The turning of the earth makes the moon seem to move across the sky each night.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that the turning of the earth makes the moon seem to move across the sky each night.

**Important word:** moon.

**Teaching helps for the pictures above:** The boy

in the picture is looking at the moon as it appears to move across the sky. The sky gets darker as the earth is rotating toward the east. Because of this movement of the earth, the moon seems to rise in the east and set in the west.

<sup>1</sup> **Sample answer:** In the first picture, the moon is near the left, or east, end of the town. In the second picture, the moon is above the centre of the town. In the third picture, the moon is near the right, or west, end of the town.

Why does it look as if the moon  
is moving during the night? <sup>1</sup>



135

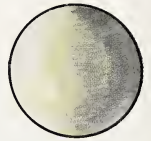
**Teaching helps for the pictures above:** The pictures above show more of the earth's movement in its relation to the moon than those on the facing page. The above pictures show why the moon appears to rise and set each night. In each picture the girl and the house remain in the same place on the earth. The girl's pointing to the moon

shows the earth's change in movement. In the first picture, the girl is pointing to the east. In the second picture, she is pointing above the house. In the third picture, she is pointing to the west. <sup>1</sup> **Sample answer:** Because the earth is turning, the moon seems to rise and set.

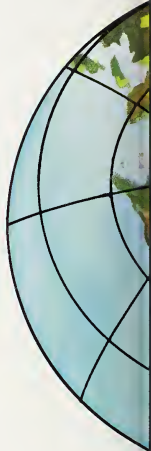
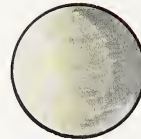


## Path of the moon

April 4



April 11



**Main concepts of the lesson (pages 136–137):**  
The moon moves around the earth.

The moon takes about one month to move around the earth.

**Performance objective:** After studying the infor-

mation provided in this lesson, the children should be able to

—state that the moon takes about one month to move around the earth.

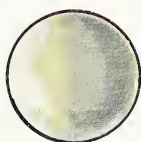
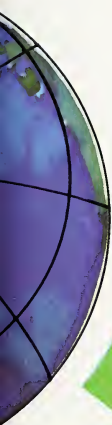
**Important words:** moon, moves.

April 29



How has the moon moved  
in these pictures?<sup>1</sup>

How long did it take?<sup>2</sup>



April 23



**Suggested activity:** After the children look at the diagram on these pages, you might suggest that the children act out the parts of the sun, the earth, and the moon. You might divide the class into groups of three. The child who is the “sun” should stand in the middle. The “earth” should turn slowly in circles away from the sun. The

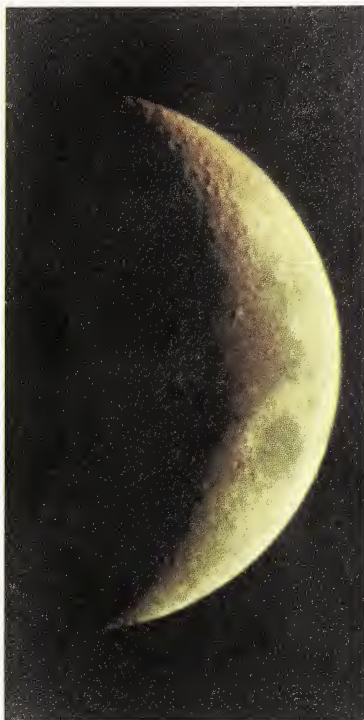
“moon” should slowly move around the earth. Both the earth and the moon should move in a counterclockwise motion.

<sup>1</sup> **Sample answer:** The moon has moved counterclockwise around the earth, or the moon has moved around the earth.

<sup>2</sup> **Sample answer:** Almost one month.



## Shapes of the moon



**Main concept of the lesson (pages 138–141):** The moon appears to change shape.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—observe that the moon appears to change shape.

**Important words:** moon, change.

**Teaching helps for the pictures above:** These pictures show some of the phases of the moon. A

new moon is a moon that cannot be seen because the sun is shining on the half of the moon that cannot be seen from the earth. The first picture on the left shows the first crescent, where the moon is in position to reflect just a small amount of light. The moon's movement in the next two weeks allows for more of the moon to be seen from the earth. You may wish to point out to the children that the moon is always round and does not change its shape. It is rather the position of the



How does the moon change?<sup>1</sup>

What are some other ways  
you have seen the moon change?<sup>2</sup>

139

moon in the sun's light which makes it appear to change shape.

<sup>1</sup> **Sample answer:** The moon seems to change shape. It changes from a small crescent to half a circle to a full circle.

<sup>2</sup> **Sample answer:** I have seen the moon seem to

change in size. (The moon appears larger on the horizon than when it is directly above.) I have seen the moon change in colour. (Reflections through the earth's atmosphere may make the moon appear white, blue, yellow, or gold.)



# FINDING OUT

- Darken the room.
- Shine a light on the earth and the moon.



140

## Teaching helps for "Finding Out":

*Materials needed:* light, globe, ball.

*Processes used:* experimenting, comparing.

*Sample findings:* A full moon can be seen from the earth when the earth is between the moon and the sun. A half-moon can be seen from the earth when the sun, the earth, and the moon form a right angle. Different shapes of the moon can be seen from the earth, depending on the angle formed by the sun, the earth, and the moon.

*Extending the "Finding Out":* You may wish to have three children set up this experiment and have the rest of the children in the class spread out into different areas of the room. Then as the "moon" moves around the earth, the other children in the class may report what they see. One child may see a full moon and a full earth and another child may see only a crescent moon and a crescent earth.

► Move the moon around the earth.

When can you see a full moon?  
When can you see a half-moon?  
What other shapes do you see?





## FINDING OUT

- ▶ Make a calendar.
- ▶ Draw the shape of the moon for today.
- ▶ Guess the shape of the moon for tomorrow.

Did you guess right?



142

### Teaching helps for "Finding Out":

*Materials needed:* paper, pencils, crayons.

*Processes used:* observing, collecting data, predicting.

*Sample findings:* The children must first discover when the moon is visible from the earth. Then they may continue to check the moon each day to

report on their calendar. After about three days, they will find that they are able to predict the shape for the following day. Depending on the starting date, the moon will appear to be "growing" in size or "shrinking" in size. It will take almost one month (29 days) for the moon's shape to be the same as when each child first started



- Each day draw the shape of the moon.
- How does the moon change?
- When does the moon look the same as when you started?

143

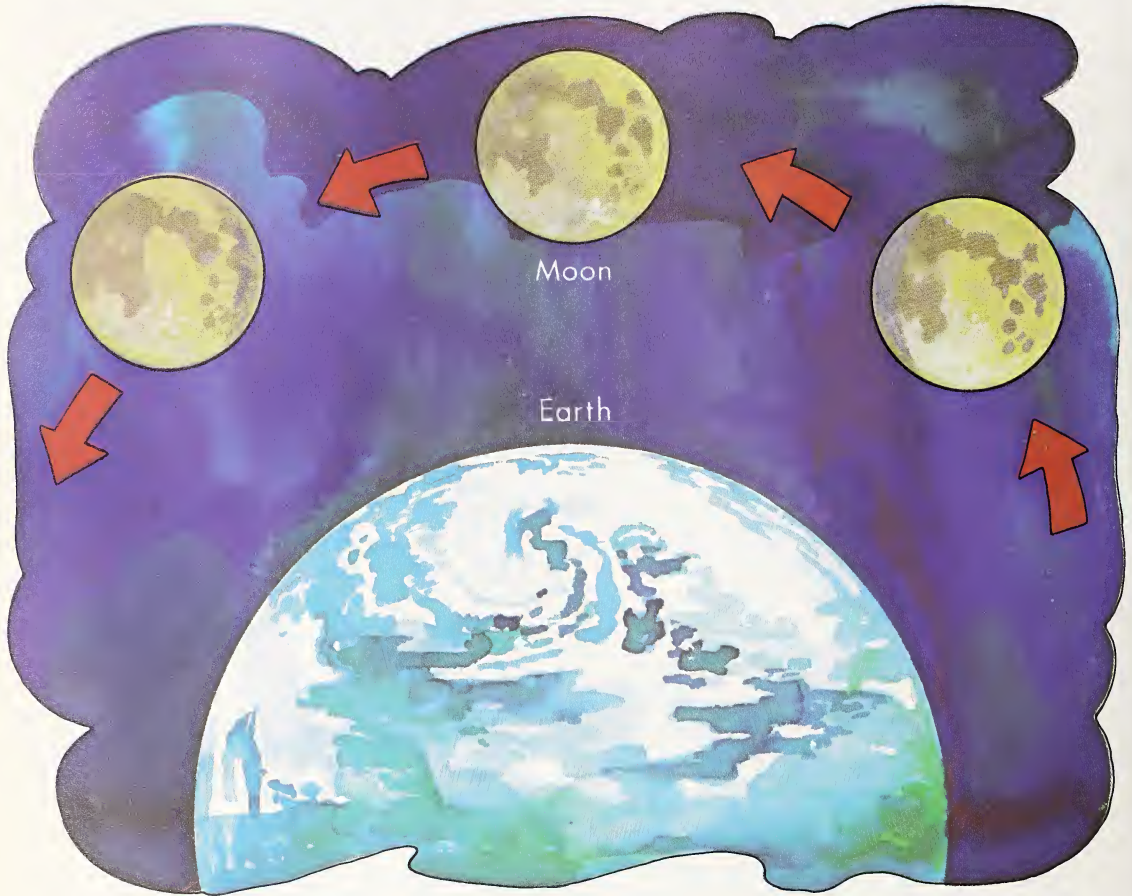
the calendar.

*Extending the "Finding Out":* You may wish to encourage the children to mark in any additional information about their observations. Such things might include the colour of the moon or whether the moon looks as though it has a ring around it. Also they may wish to show in their drawings

the clearness and brightness of the moon. Sometimes the moon appears clearer and brighter than at other times.



## Seeing one side of the moon



What do these pictures show about the moon?<sup>1</sup>  
How might you see the back of the moon?<sup>2</sup>

144

**Main concept of the lesson (pages 144–145):**

The moon always shows its same side to the earth.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that the moon always shows its same side to the earth.

**Important word:** moon.

**Teaching help for the picture above:** The picture

of the moon in its movement around the earth shows that the same side of the moon always faces the earth.

<sup>1</sup> **Sample answer:** The pictures of the moon show that the moon always shows its same side to the earth.

<sup>2</sup> **Sample answer:** Travel in a rocket to the other side of the moon.

## FINDING OUT



- ▶ Place a globe on a table.
- ▶ Face the globe. Make believe you are the moon.
- ▶ Walk around the globe so that you always face it.



How did you move?

How does the moon turn so it always faces the earth?

### Teaching helps for "Finding Out":

*Material needed:* globe.

*Processes used:* observing, inferring, communicating.

*Sample findings:* The children will discover that they will have to walk in a side-stepping motion in order to continue facing the earth. The moon's

movement around the earth shows a slight turn in order for it to show its same side to the earth. *Additional information:* You may wish to explain to the children that people have been studying the moon for thousands of years. It was not until the late 1950's that anyone saw photographs of the back side of the moon.



## The moon's surface



How does the ground on the moon  
look like the ground you walk on?<sup>1</sup>  
How does it look different?<sup>2</sup>

146

**Main concept of the lesson (pages 146–147):** The ground and rocks on the moon are made up of much the same things that make up the ground and rocks on the earth.

**Performance objective:** After studying the information provided in this lesson, the children should be able to  
—state that the ground and rocks on the moon

are made up of much the same things that make up the ground and rocks on the earth.

**Important words:** moon, ground, rocks.

<sup>1</sup>**Sample answer:** The brown dirt on the moon looks brown, dusty, and crumbly, like some of the dirt on the earth.

<sup>2</sup>**Sample answer:** It does not show weathering from rain or wind.





How do these moon rocks  
look like rocks you have seen?<sup>1</sup>  
How do they look different?<sup>2</sup>



147

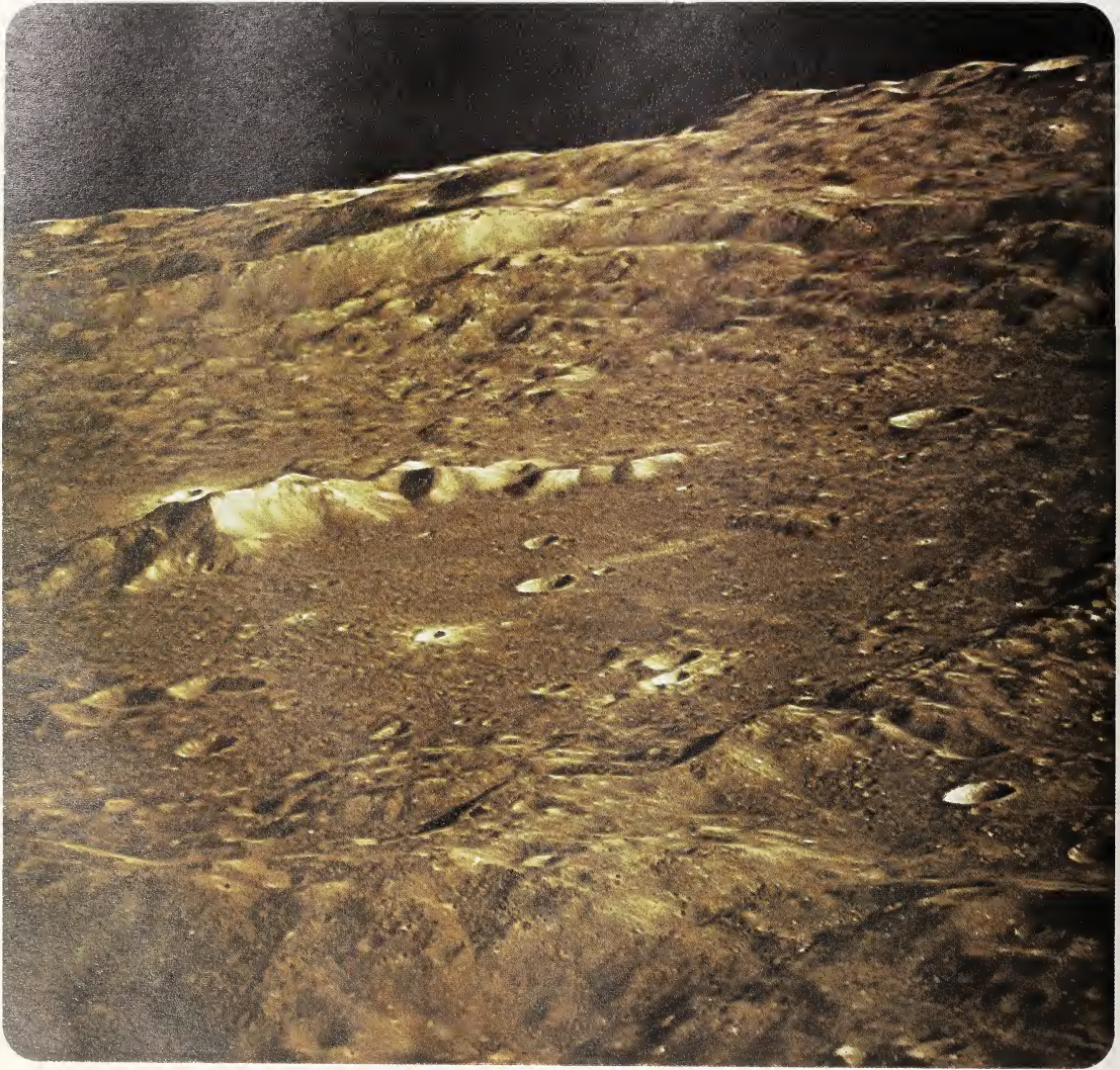
**Teaching helps for the pictures above:** The pictures of these rocks are samples of some of the rocks that were brought back from the moon. The astronauts who traveled to the moon brought back many samples of dirt and rocks so the samples could be analyzed on the earth. The rocks in the first picture at the top of the page are no larger than the head of a pin.

<sup>1</sup> **Sample answer:** The rocks in the picture at the top of the page look like jewels or precious stones. The rocks in the bottom picture look like many dull, rough rocks on the earth.

<sup>2</sup> **Sample answer:** The rocks in the top picture do not look like rocks on the earth because of their colour and brightness.



## The moon and the earth



148

**Main concept of the lesson (pages 148–149):** There is no air or water on the moon.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that there is no air or water on the moon.

**Important words:** moon, earth.

**Suggested discussion:** As the children are looking

at the pictures on these pages, you may wish to have the children discuss some of the many things that are on the earth but are not found on the moon. Then you might ask them to compare the things which are pictured on the moon and on the earth. You might ask questions such as these: Why isn't snow found on the moon? Why aren't pine trees found on the moon?





How are the moon  
and the earth different?<sup>1</sup>

Do you think things  
could live on the moon?

Why or why not?<sup>2</sup>

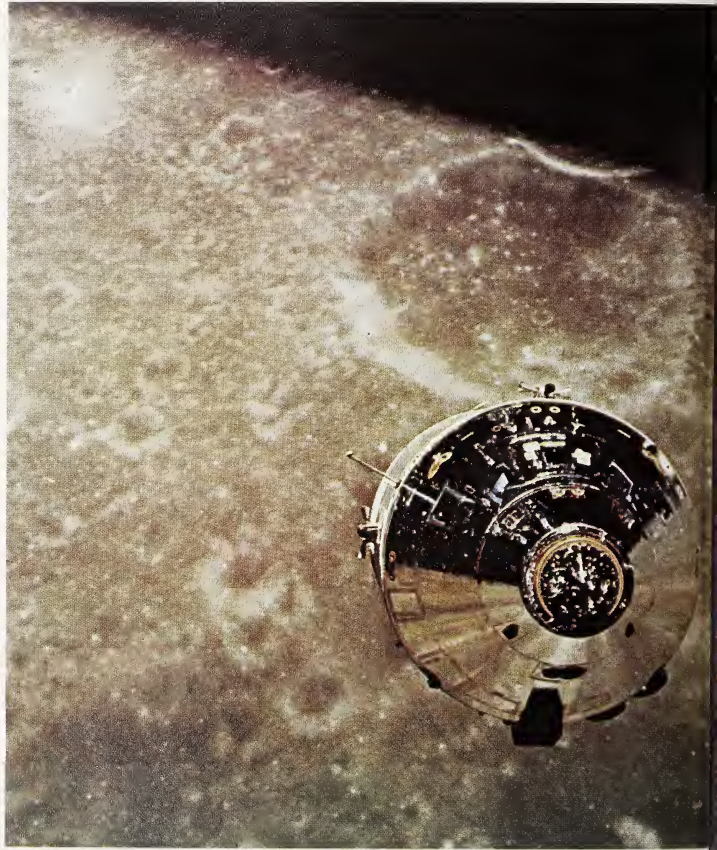
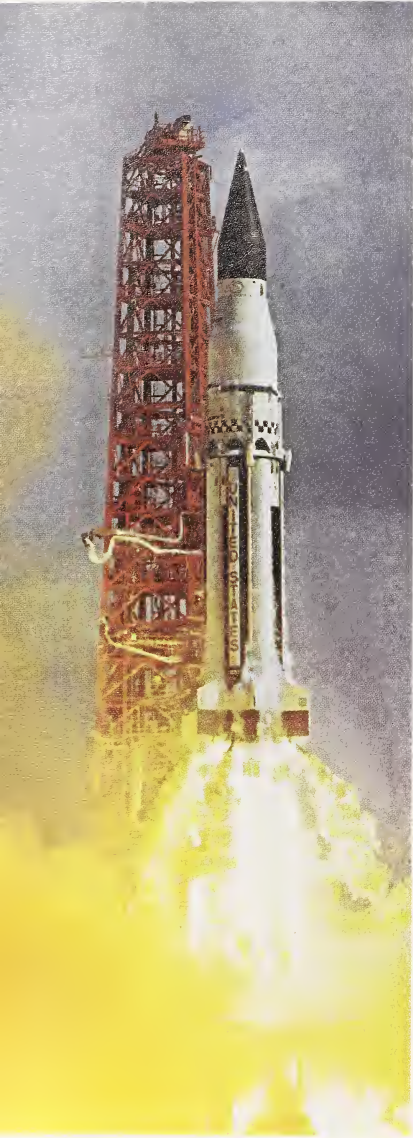
<sup>1</sup> **Sample answer:** The moon has no blue skies, mountains, forests, lakes, animals, or clouds.

<sup>2</sup> **Sample answers:** No. There is no air or water

on the moon. Plants, animals, and people need air and water in order to live.



## People on the moon



150

**Main concept of the lesson (pages 150–151):** People have traveled to the moon.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that people have traveled to the moon.

**Important words:** people, moon.

**Teaching helps for the pictures above:** The pictures on page 150 show two of the steps involved in getting people to the moon. The rocket must be very powerful to get into space. The space capsule, pictured at the right, holds three people. It helps people not only travel near the moon but also helps them return to the earth.





How do people  
get to the moon?<sup>1</sup>

How do people  
stay alive on the moon?<sup>2</sup>

Would you like to go  
to the moon? Why?

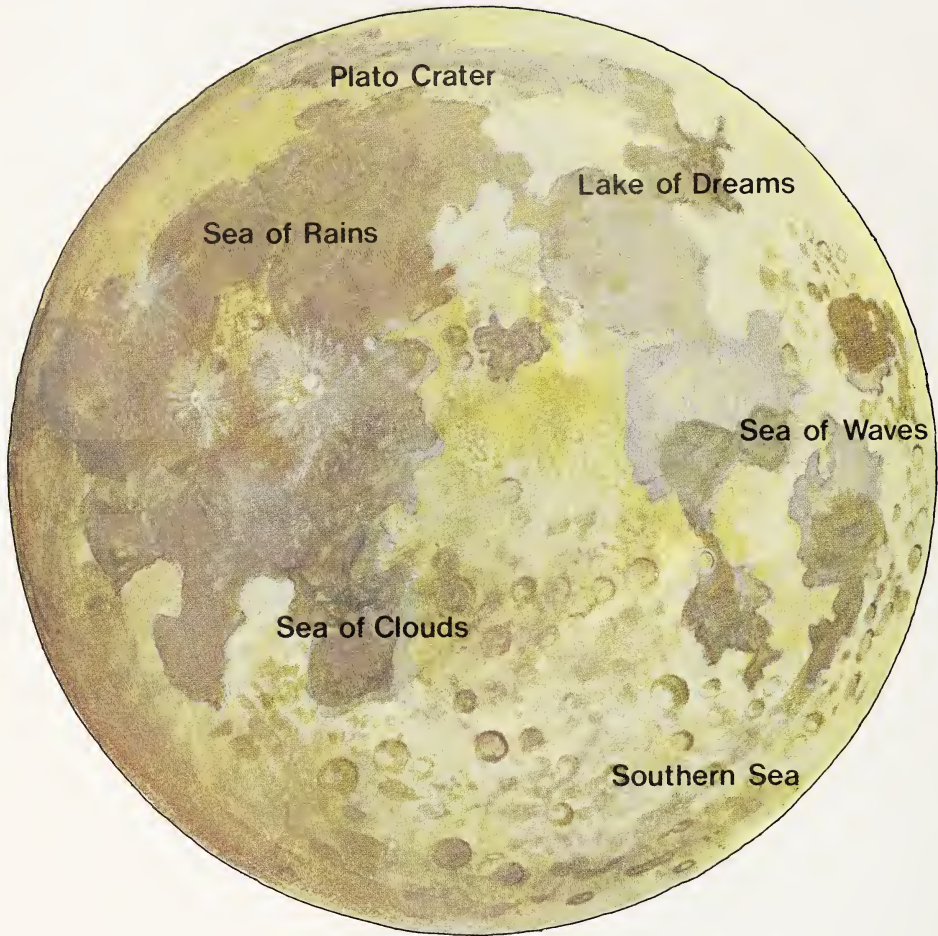
**Teaching helps for the pictures above:** The top picture shows the lunar module. It is used as transportation to and from the moon. The rover, on the right, is used as transportation on the moon. The footprints and tire marks made by the rover will always remain since no wind or rain will help cover them up.

<sup>1</sup> **Sample answer:** Rockets powered by special engines lift the spacecraft high above the earth. Space capsules powered by other engines direct astronauts close to the moon. Special craft then land the astronauts on the moon.

<sup>2</sup> **Sample answer:** People must bring air, food, and water from the earth.



## Maps of the moon



**Main concept of the lesson (pages 152-153):** Maps have been made of the moon.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

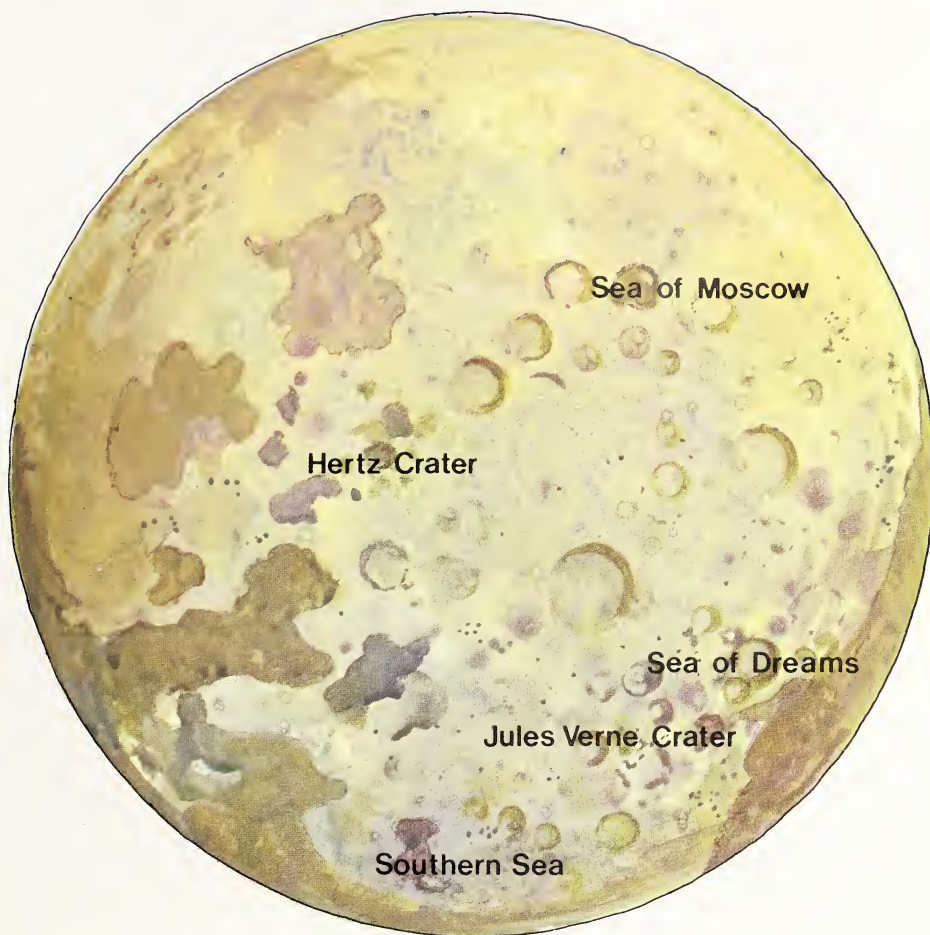
—recognize a map of the moon.

**Important words:** map, moon.

**Teaching helps for the pictures above:** The map on page 152 shows features of the side of the moon which faces the earth. The map on page 153

shows features of the side of the moon which cannot be seen from the earth.

**Suggested discussion:** As the children look at the maps, you might ask these questions: Do the names of areas on the moon sound like areas on the earth? Why do you think names like *sea*, *lake*, *cloud*, *rain*, and *wave* were used when those things don't exist on the moon? (Sample answers: Yes. Many areas of the moon were named before anyone knew what was on the moon.)



What do these maps show?<sup>1</sup>  
Why do people make maps  
of the moon?<sup>2</sup>

153

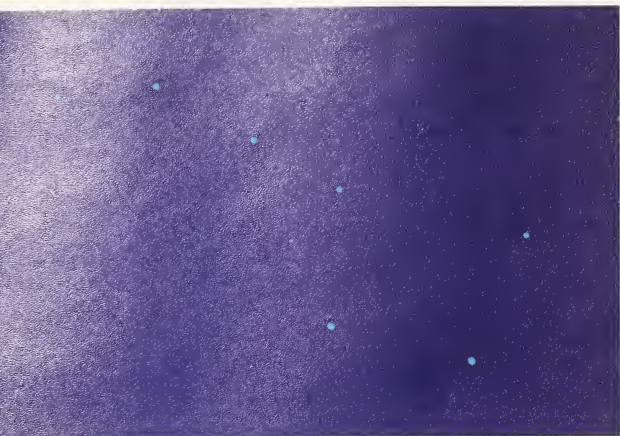
**Suggested activity:** You may wish to promote an activity of comparisons. The children may find maps of different areas of the earth and compare those maps with the moon maps.

<sup>1</sup> **Sample answer:** These maps show the different

sides of the moon. They show that the moon is rough in some areas and smooth in others.

<sup>2</sup> **Sample answer:** When people study the moon, they can find certain areas that are marked on the maps.





## Other things in space



154

**Main concept of the lesson (pages 154–157):**

There are many things in space beyond the moon.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state that there are many things in space beyond the moon.

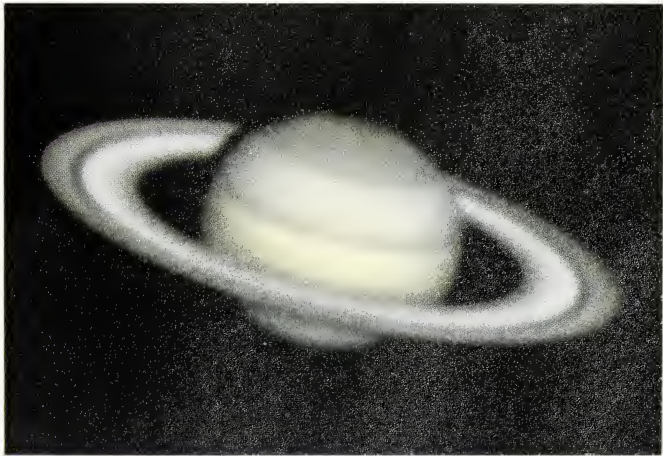
**Important word:** space.

**Teaching helps for the pictures above:** The top picture shows the Big Dipper. The bottom picture is the sun. The top picture on page 155 shows some of the billions of stars which are part of the universe. The bottom picture on page 155 shows Saturn. Saturn is a planet which, like the earth, moves around the sun.



What things in space  
do these pictures show?<sup>1</sup>

What are some other  
things in space?<sup>2</sup>



**Suggested activity:** You may wish to suggest to the children that they look at the sky on a clear night. The stars in the Big Dipper are bright and are not difficult to find. Near the Big Dipper is the Little Dipper. Some children may also be able to spot the Little Dipper on a clear night.  
<sup>1</sup> **Sample answer:** The Big Dipper, the sun, stars, and Saturn.

<sup>2</sup> **Sample answer:** Other planets (the children may mention any of the nine known planets in the solar system), shooting stars, comets, and any of the many satellites made on the earth which have been sent into space. Some of the children might also mention the moons that belong to planets other than the earth.



# FINDING OUT

- Find pictures in magazines or newspapers about things in space.



156

## Teaching helps for "Finding Out":

*Materials needed:* old magazines and newspapers, paper, pencil, crayons.

*Processes used:* collecting data, classifying, communicating.

*Sample findings:* The children will most likely find a great deal of information about space travel and exploration, new discoveries, and objects in space. They may wish to draw some of the

things they have seen on television which have to do with space.

*Extending the "Finding Out":* Many cities have observatories or special exhibits of space information. You may wish to plan a special trip to an observatory or exhibit. The children might think of questions they may have about the moon and other things in space that they may wish to have answered.

- ▶ Draw pictures of other things in space.



What did you learn  
about different things in space?



## Words to Know

moon  
daytime

earth  
nighttime

change  
space

## Picture to Think About



What is happening  
in this picture?

158

**Reviewing the important words:** You may wish to use the words under "Words to Know" to help the children review the important words in this unit.

**Applying knowledge:** You may wish to encourage the children to apply the knowledge they have gained about some of the concepts in this unit. Have the children look at the picture under

"Picture to Think About." Then have the children read the question under the picture and discuss their answers to the questions.

**Sample answer for "Picture to Think About":** The picture was taken on the moon. It shows a half earth rising above the moon's horizon.

## Questions to Answer

1. Where does moonlight come from?
2. Why can the moon be seen in different places?
3. Why does the moon seem to change shape?

## Fun Things to Do

Plan a trip to the moon.

Make a list of the things you will need to take with you.

Draw pictures of things you will do.

Visit a planetarium.

Or, visit a museum.

Find out more about the moon and other things in space.

**Suggestion for evaluation:** You may wish to use the questions under "Questions to Answer" to evaluate the children's understanding of the main concepts of the unit.

**Sample answers for "Questions to Answer":** 1. Moonlight is light from the sun. The sun's light bounces off the moon and shines on the earth. 2. The moon seems to rise in the east and set in the west because of the turning of the earth. 3.

The moon travels around the earth. As the moon travels, it bounces light from the sun into different shapes.

**For further involvement:** You may wish to use "Fun Things to Do" to involve the children in fun activities which reinforce some of the main concepts of the unit "The Moon." You may also wish to encourage the children to make up additional activities related to this unit.



# 6 Rocks and Soil



**Preparing for the unit:** For a list of instructional materials helpful in teaching this unit, see page T12 of the Teacher's Manual. These instructional materials include general references for the teacher, books for children, and filmed or recorded materials. You may also wish to check the

list of materials needed for each "Finding Out" activity in this unit and have the children begin collecting these materials. The list of materials for each "Finding Out" activity is given under "Teaching helps for Finding Out" on pages 164, 167, 170, 176, 180, 183, and 186.





Do you think Jenny learned  
what a rock is? Why?<sup>1</sup>

What do you know about rocks?<sup>2</sup>

**Introducing the unit:** You may wish to have the children look at the cartoon above. Then have the children read the questions below the cartoon and discuss their answers to the questions.  
**Sample answers for questions below the cartoon:**

<sup>1</sup> Yes. Because she carried one to show her brother.

<sup>2</sup> Some are big. Some are small. They are different in colour.



# Finding rock



A



B



C

162

**Main concept of the lesson (pages 162–165):** Rocks are found in many places.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—list some places where rocks are found.

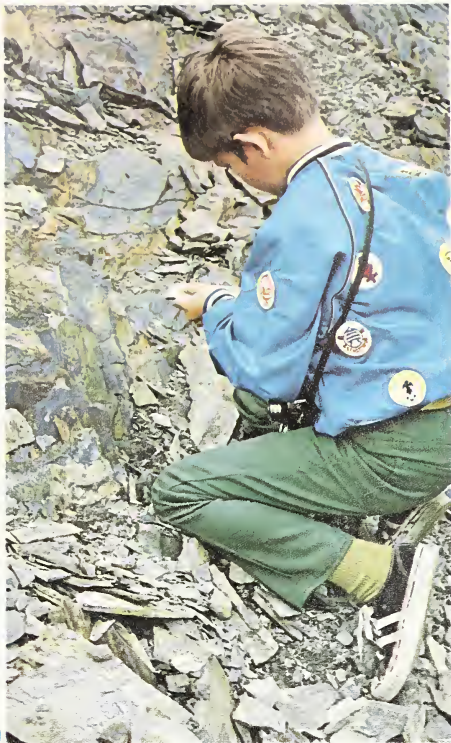
**Important word:** rocks.

**Suggested discussion:** After discussing the material on pages 162 and 163, you may wish to ask the children the following question: Where are

the rocks found in each picture on these pages? (Sample answer: The rocks in picture A on page 162 are found deep in the water. The rocks in picture B on page 162 are found just under the ground. These rocks have trees growing in them. The rocks in picture C on page 162 and in picture D on page 163 are found just above the ground. The rocks in picture E on page 163 are found deep in the ground. These rocks are being taken out of the ground for people to use.)



Rocks are found in many places.  
Where have you found rocks?<sup>1</sup>



D

E

**Suggested research and discussion:** After discussing the material on pages 162 and 163, you might want to have the children look in magazines to find pictures of rocks found in different

places. Then you may wish to have the children display their findings on a bulletin board.  
<sup>1</sup> **Sample answer:** On a sidewalk, in a street, in a field, on the playground, making up buildings.



# FINDING OUT

- Draw some pictures of places near you where you might find rocks.



- Get some rocks from each place.



164

## Teaching helps for "Finding Out":

*Materials needed:* paper, crayons, paper bag or plastic bucket.

*Processes used:* predicting, observing, classifying, comparing.

*Sample findings:* After observing the rocks from each place, the children will most likely find that many of the rocks from each place are alike, but the rocks from one place are mostly different from the rocks from the other places.

*Additional information:* At this time, some of the children may want to know why rocks from different places are different. To answer this question, you might explain to the children that different kinds of rocks are made up of different kinds of minerals. Different kinds of rocks are formed in different ways and are often formed in different places and therefore are found in different places.

Put each rock by the picture  
of the place where you found it.

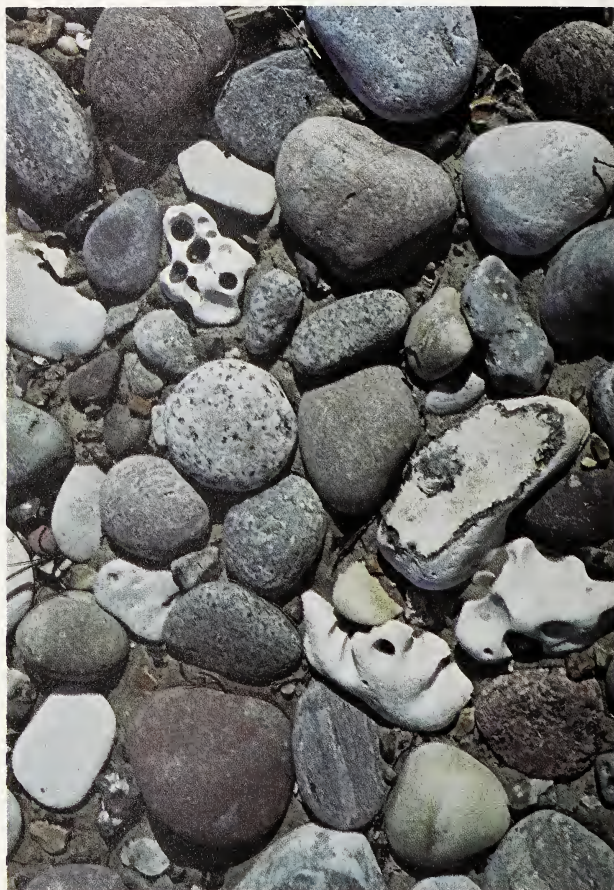


What did you find out  
about the rocks from each place?  
Save your rocks for later.





## How rocks are different



In what ways do these rocks look different from one another?<sup>1</sup>  
How else might they be different?<sup>2</sup>

**Main concept of the lesson (pages 166–167):** Rocks are different in many ways.

**Performance objectives:** After studying the information provided in this lesson, the children should be able to

- name some ways rocks are different;
- sort rocks according to their differences.

**Important words:** rocks, different.

<sup>1</sup> **Sample answer:** In colour, in size, in shape.

<sup>2</sup> **Sample answer:** In texture, in mass.

# FINDING OUT



► Look at each rock you found before.

► Put the rocks that are most alike in groups.

How are the rocks in each group different from those in the other groups?

167

## Teaching helps for “Finding Out”:

*Materials needed:* rocks from the “Finding Out” activity on pages 164 and 165.

*Processes used:* observing, classifying, inferring.

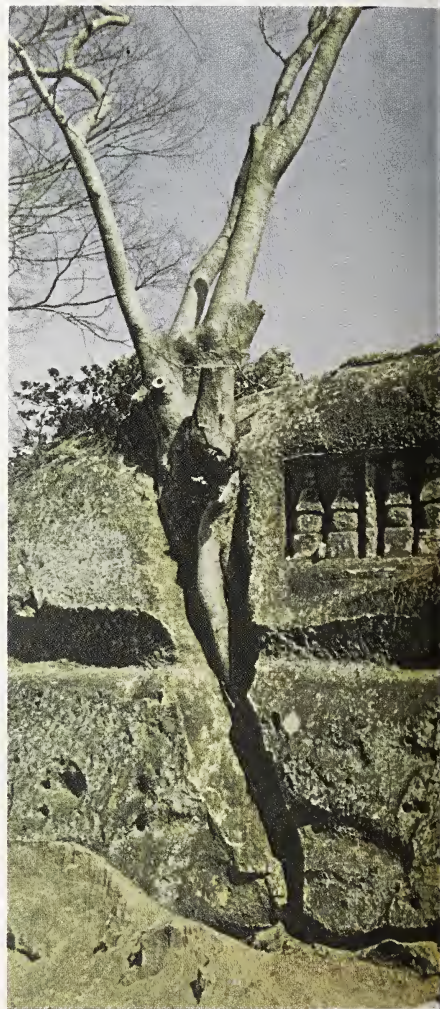
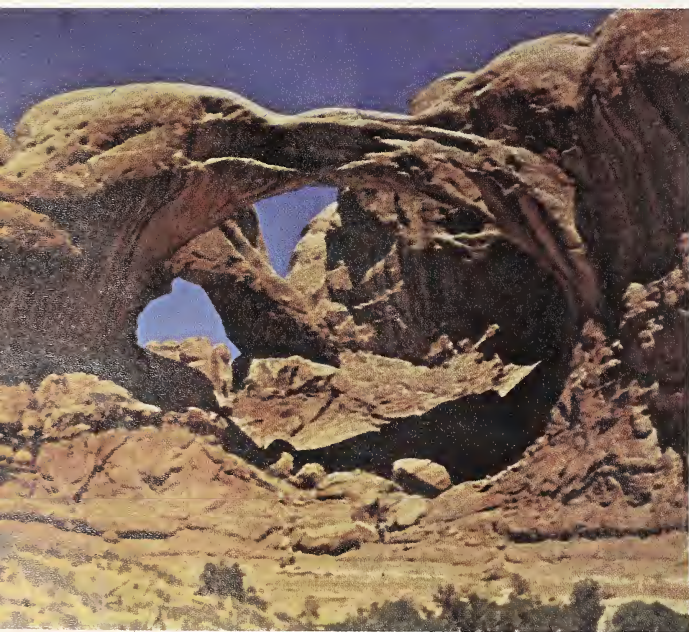
*Sample findings:* After comparing the rocks in one group with those of the other groups, the children will most likely find that the rocks are mainly different in size, shape, colour, or texture.

*Extending the “Finding Out”:* At this time, you may wish to have the children discover other ways rocks are different. You may do this by having the children wash and smell each rock. You might then have the children put the rocks in order according to their mass. Next you may want to ask the children to show you the heaviest rocks and the biggest rocks to help them see that the heaviest rocks are not always the biggest.



## Changes in rocks

The wind took a long time to change the rocks in the picture below. Why?<sup>1</sup>



**Main concept of the lesson (pages 168–171):**

Rocks can be changed.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—name three things that can change rocks.

**Important words:** wind, change.

**Teaching helps for the pictures above:** Wind carries sand. The sand hits larger rocks with a rubbing or grinding effect, eventually causing pieces of the rocks to break off. The roots of a tree may eventually cause rocks to break as the roots grow toward water.

**<sup>1</sup> Sample answer:** Because rocks are very hard.



What changed the rocks  
in these pictures?<sup>1</sup>

Do you think it took a long time  
to change these rocks? Why?<sup>2</sup>

**Suggested activity:** After discussing the material on pages 168 and 169, you may wish to point out to the children that frozen water, or ice, can also change rocks. You might then want to involve the children in an activity which would show evidence that ice changes rocks. Have the children fill a jar with water and put the lid on the jar. Then have the children put the jar in a paper bag and place the bag in the freezer of a refrigerator until the water freezes. The children may find that when

the water freezes, it expands and breaks the jar, just as it may break rock.

<sup>1</sup> **Sample answer:** A tree, people, water.

<sup>2</sup> **Sample answers:** It took the tree and the water a long time to change the rocks because these things are not as strong as rocks. It took the people a short time to change the rocks because the people used machines and tools that were stronger than the rocks.



# FINDING OUT



- Find some rocks that are not alike.
- Try to change each rock in many ways.

170

## Teaching helps for "Finding Out":

*Materials needed:* paper bag or plastic bucket, rocks, coins, tin can, hammer, cloth, protective glasses.

*Processes used:* observing, comparing, inferring.

*Sample findings:* The findings will vary depending on the kinds of rocks found. However, the children

will most likely infer that the rocks that were easier to change were softer than the rocks that were harder to change.

*Additional information:* You may wish to have the children use a cloth to rub each mark they make, to make sure that they actually scratch into the rocks.



Which rocks were easier to change? Why?

Which rocks were harder to change? Why?

**Suggested activity and discussion:** After the children break open some of the rocks, you may wish to have the children compare the inside of their rocks with the outside. You might then want to ask the children these questions: How is the inside of each rock different from the outside?

Why is it different? (Sample answers: The insides that are different are rough and darker in colour whereas the outsides are smooth and lighter in colour. This is so because the insides have not been worn down by water or wind.)



## Using rocks



172

**Main concept of the lesson (pages 172–173):**

People use rocks in many ways.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state some ways people use rocks.

**Important word:** rocks.

**Suggested discussion:** After discussing “Using Rocks,” you may wish to point out to the children

that different kinds of rocks are used in different ways. You might then want to ask the children this question: Why do you think different kinds of rocks are used in different ways? (Sample answer: Because some rocks are prettier than others and look nicer in jewelry and statues. Some rocks are stronger than others and hold buildings together better. Other rocks burn and can be used to heat homes.)





In what ways are these rocks being used?<sup>1</sup>

What are some other ways rocks may be used?<sup>2</sup>



**Suggested activity:** After discussing the material on pages 172 and 173, you may want to help the children learn more about how people use rocks. You might do this by planning a visit to an art museum containing sculptures or by going to see a lapidary make jewelry. Or you may want to plan a

trip around the neighborhood to have the children find rocks used by people.

<sup>1</sup> **Sample answer:** To make a sculpture, to build something, to make jewelry.

<sup>2</sup> **Sample answer:** To decorate a garden, to burn for heat, to make a sidewalk, to make some roads.





## What soil is made of



174

### **Main concept of the lesson (pages 174–177):**

Soil is made up of many things.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

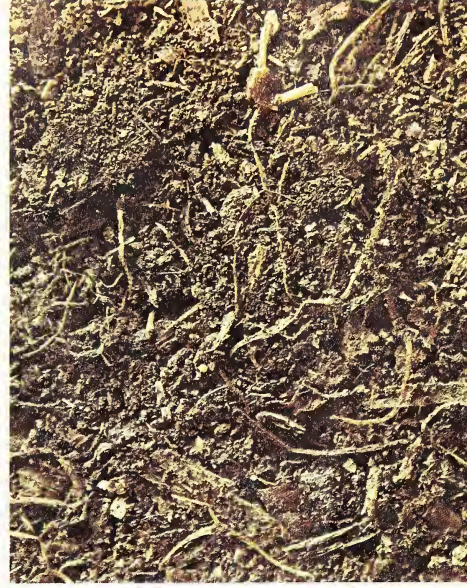
—name some things that make up soil.

**Important word:** soil.

**Suggested activity:** After discussing “What soil is made of,” you may wish to involve the children in

an activity which would help them understand how soil is made. Have the children rub two soft rocks such as two sandstones together to form soil. If you have limestone available to you, you might have the children put limestone into a cup of vinegar. The vinegar will dissolve the limestone into soil, releasing minerals, just as natural acids from rain, plants, and chemicals change rocks.





What things make up the soil  
in these pictures?<sup>1</sup>

<sup>1</sup> Sample answer: Rocks of various sizes, clay, sand, remains of living things, living things.



## FINDING OUT

➤ Find some soil.



176

### Teaching helps for "Finding Out":

*Materials needed:* shovel, bucket, jar, spoon.

*Processes used:* observing, inferring.

*Sample findings:* After looking at the jar for a few minutes, the children will most likely see that soil is made up of different materials of different sizes, colours, and textures, the heaviest of which sink to the bottom of the jar first.

*Extending the "Finding Out":* At this time, you may wish to have the children examine the different parts of the soil. Have the children pour the water out of the jar. Then have the children try to separate the different materials. You might want to have the children feel and smell the soil and examine it with a hand lens, if available.



- ▶ Put some of the soil into a jar.
- ▶ Put some water into the jar.

- ▶ Stir the water and soil.
- ▶ Watch the soil for a few minutes.

How are the parts of the soil different?



**Suggested activity:** After completing the “Finding Out,” you might want to involve the children in an activity which would help them discover that soil may also contain water. Have children feel and then weigh some garden soil. Then have them put it into a jar placed in a sunny place for a week.

After a week, have the children feel and weigh the soil again so they find that it is drier and lighter in weight. At this time, some of the children may wonder where the water went. You might explain that it evaporated. That is, the water turned into a gas and went into the air.



## Finding soil



178

**Main concept of the lesson (pages 178–181):**

Soil is found in many places.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—point out soil in several places.

**Important word:** soil.

**Suggested discussion:** After discussing “Finding

soil,” you may wish to ask the children the following questions: Is the soil in each picture alike? If not, how is it different? (Sample answers: No. It is different in colour. It is made up of different things. It is drier in some places and wetter in others.) You might also want to point out to the children that soil is carried by wind, rain, and rivers to different places.



Point to the soil in these pictures.  
Where else might soil be found?<sup>1</sup>



179

**Suggested activity:** After discussing the material on pages 178 and 179, you may wish to have the children collect pictures of soil in different places.

These pictures might then be used in a bulletin-board display.

<sup>1</sup> **Sample answer:** In streets, at the beach.



# FINDING OUT

► Find some soil from different places.



180

## Teaching helps for "Finding Out":

*Materials needed:* broom, bucket, shovel.

*Processes used:* observing, comparing.

*Sample findings:* After examining the soil from

each place, the children may find that the soil is alike or different in colour, texture, or odour. The soil may have things that were once alive. It may have living things.

► Find out about the soil  
in many ways.



How is the soil from each place  
the same?

How is the soil different?



# Soil and living things



In what ways is soil helping these living things?<sup>1</sup>



182

**Main concept of the lesson (pages 182–183):** Soil is helpful to living things.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—state two ways soil is helpful to living things.

**Important word:** soil.

**Suggested discussion:** After discussing the material on this page, you might ask the children the following question: In what other ways is soil

helpful to living things? (Sample answer: Plants which grow in soil may be food for animals. Some of these plants are food for people. Things which birds use for nests may come from plants in soil. Trees which people use for wood to make things such as homes, tables, and chairs grow in soil. People make pottery out of clay, which is a kind of soil.)

<sup>1</sup> **Sample answer:** It provides a home for animals, a place for plants to grow, and food for people.

## FINDING OUT



- ▶ Plant some seeds in many kinds of soil.

- ▶ Give your growing seeds the same amount of water and light.

Does one kind of soil help your plants grow best?  
If so, which kind?



183

### Teaching helps for "Finding Out":

*Materials needed:* seeds, such as lima beans or radishes; 2 or 3 kinds of soil, such as clay, sand, topsoil, or potting soil; 2 or 3 milk cartons; scissors.

*Processes used:* observing, experimenting, comparing.

*Sample findings:* The children may notice that the

plants in one kind of soil grow best. This soil is probably a mixture of sand, loam, and peat.

*Additional information:* Soil which helps plants grow best has the right amount of minerals and holds the right amount of water. Clay tends to hold too much water for plants. Sand may not hold enough water.



## Taking care of soil

These pictures show  
some things that are bad for soil.  
What are these things?<sup>1</sup>



**Main concept of the lesson (pages 184–187):**

Soil needs to be taken care of.

**Performance objective:** After studying the information provided in this lesson, the children should be able to

—show what they can do to help take care of soil.

**Suggested discussion:** After discussing the pictures above, you may wish to ask the children this

question: Why, do you think, are litter and too much water bad for soil? (Sample answer: Because they keep the soil from being able to give plants the things they need in order to grow. They keep soil from being able to give some animals a home.)

<sup>1</sup> **Sample answer:** Litter, too much water.



How are these people helping soil?<sup>1</sup>

What can you do to help soil?<sup>2</sup>

**Teaching helps for the pictures above:** At this time, you may wish to point out to the children that trees, grass, and other plants help hold soil in place when water runs on it or wind blows on it.

<sup>1</sup> **Sample answer:** They are keeping the soil free from litter and planting a tree in soil.

<sup>2</sup> **Sample answer:** Not throw litter on soil and leave plants alone so that they may grow in soil.



## FINDING OUT

► Find some dry soil.



186

### Teaching helps for "Finding Out":

*Materials needed:* dry soil, pan or dish, cardboard.

*Processes used:* observing, inferring.

*Sample findings:* After fanning the soil, the children will most likely observe that the soil is blown from place to place. After pouring water on

the soil, the children may see that the soil is washed down the slope, causing ruts in the hill. From these findings, the children may infer that living things that make their home in soil or grow in soil might not be able to live if the soil is blown or washed away.

► Fan the dry soil to show how wind can be bad for it.

► Show how water can be bad for soil.



What might happen to living things when soil is blown or washed away?

*Extending the "Finding Out":* You may wish to have the children find examples of soil erosion in their neighbourhood.



## Words to Know

water  
rocks

change  
wind

soil  
plants

seeds  
light

## Picture to Think About



How is soil important  
to the living things in this picture?

188

**Reviewing the important words:** You may wish to use the words under "Words to Know" to help the children review the important words in this unit.  
**Applying knowledge:** You may wish to encourage the children to apply the knowledge they have gained about some of the concepts in this unit. Have the children look at the picture under "Pic-

ture to Think About." Then have them read the question under the picture and discuss their answers to the question.

**Sample answer for "Picture to Think About":** The plants grow in the soil. Some of the plants are food for the rabbit. The soil is a home for the other animals.

## Questions to Answer

1. Where are some places that rocks may be found?
2. What are some ways rocks are used?
3. Where are some places that soil may be found?
4. What are some ways soil helps living things?
5. What are some ways people can help soil?

## Fun Things to Do

Draw or find pictures of soil and rocks being used.

Look around your home or school for soil that needs help.  
Try to help the soil.

**Suggestion for evaluation:** You may wish to use the questions under "Questions to Answer" to evaluate the children's understanding of the main concepts of the unit.

**Sample answers for "Questions to Answer":**  
1. Deep under the ground, in the water, above the ground. 2. For jewelry, for building things, for sculpturing. 3. Under the water, in cracks in a

home and a place to grow. 5. They can keep litter off the soil. They can plant trees to keep water from washing the soil away.

**For further involvement:** You may wish to use "Fun Things to Do" to involve the children in fun activities which reinforce some of the main concepts of the unit "Rocks and Soil." You may also wish to encourage the children to make up addi-



# Some Science Words to Know

## Unit 1 Food for Animals and You

animals, 8, 9, 11–13, 15, 16,  
18, 19, 25, 27

farm, 29

food, 8, 9, 11, 13, 15, 16,  
18–21, 23, 25–28

food chain, 17, 29

nature, 17

plants, 12, 13, 23, 26

## Unit 2 Environment

air, 51

animals, 42, 43, 61

environment, 35–37, 39, 40,  
42, 43, 52, 55, 56, 58, 59, 61

food, 51

light, 47

people, 39, 40

plants, 43, 56, 58, 59

sound, 47–49

water, 51

weather, 52, 53

## Unit 3 Measuring

centimetres, 74–77

decimetres, 78–81

length, 71–73

measure, 67, 71–85, 87, 91

measuring, 71, 74, 89

metres, 82–85

## **Unit 4 Magnets**

iron, 101, 108, 111, 123, 125  
magnet, 99, 101–111, 113–121,  
122, 123, 125

pulling, 112  
pushing, 121  
strong, 107, 109–111

## **Unit 5 The Moon**

change, 139, 143  
daytime, 132  
earth, 140, 141, 145, 149  
moon, 130–135, 137, 139–147,  
149, 151, 153

nighttime, 132  
space, 155–157

## **Unit 6 Rocks and Soil**

change, 168–171  
light, 183  
plants, 183  
rocks, 163–171, 173

seeds, 183  
soil, 175–177, 179–187  
water, 177, 183, 187  
wind, 168, 187



De Wys, Inc./Curt Kaufman, 42 (top left). De Wys, Inc./Prof. Rita Atkins, 131.  
De Wys, Inc./M. Vanderwall, 182 (bottom). A. Devaney, Inc.: 17 (bottom),  
139 (left), 149, 151 (top), 178 (left), 182 (top). Editorial Photocolor Archives/  
Peter Vadnai, 179 (top). Dwight Ellefsen, 166 (left). John D. Firestone:  
21 (top right), 38 (top), 66 (left), 67, 76, 78, 81 (both), 82, 83 (both), 87 (right),  
90 (bottom), 92, 93 (both), 102, 103, 104, 105 (both), 108, 110, 111, 112 (both),  
113 (both), 114 (left), 115 (both), 116 (both), 117 (both), 118 (left), 120,  
125 (both), 126, 183 (both). Grant Heilman: 29 (bottom), 56 (left), 60 (both),  
61 (bottom right), 162 (top right), 163 (left), 169 (both), 175 (both), 184 (both),  
185 (bottom). Grant Heilman/Hal Harrison, 8 (left). Lick Observatory, 155  
(bottom). Milt and Joan Mann, 162 (bottom). Monkmeyer Press Photo Service/  
Leonard Lee Rue III: 8 (bottom right), 94. Monkmeyer Press Photo Service/  
Freda Leinwand, 23 (bottom). Anne Morley, 36 (right), 40 (all), 41 (bottom  
right), 58 (both), 59 (both), 68, 69 (both), 71 (bottom), 80, 86 (bottom),  
164 (top), 165. NASA: 147 (bottom), 150 (left). National Audubon Society/  
Cosmos Blank: 16 (both), 17 (top). Photo Research Int.: 21 (left), 22 (left), 34  
(both), 35 (both), 36 (left), 37, 39 (top left and right), 41 (bottom left),  
46 (bottom), 47 (right), 48 (both), 49 (both), 50 (top), 51 (bottom), 52 (left),  
54 (all), 55 (both), 57 (bottom), 62, 146, 147 (top), 148, 151 (bottom),  
174 (bottom). Photo Research Int./C. Gaynor, 24 (right). Photo Research Int./  
Lani: 41 (top), 52 (right). Photo Research Int./Everett C. Johnson, 173 (top).  
Root Resources: 57 (top), 173 (bottom). Root Resources/Ted Farrington,  
14 (bottom). Root Resources/Delores Backe, 50 (bottom). Root Resources/  
Earl Kubis, 138 (right). Root Resources/Mary A. Root, 163 (right). Root  
Resources/Louise K. Broman, 179 (bottom). Tom Stack and Associates: 14 (top),  
61 (top), 154 (bottom). Tom Stack and Associates/Earl Kubis, 8 (top right).  
Tom Stack and Associates/Frederick H. Kerr, 11 (top). Tom Stack and  
Associates/C. Kussner, 138 (centre). Tom Stack and Associates/Ron Church, 162  
(bottom left). Sunrise Photofeatures/Rohn Engh: 21 (bottom right), 28 (both), 39  
(bottom left), 46 (top). Taurus Photos/Anthony Mercieca, 10 (top left).  
Taurus Photos/Charles E. Schmidt, 20 (left). Taurus Photos/J. R. Westlake,  
138 (left). Larry P. Trone: 12, 13, 19 (bottom right), 24 (left), 44 (both), 45.  
Paul Tucker: 43 (top), 47 (left). Van Cleve Photography/Audrey Ross, 10 (top  
right). Van Cleve Photography/Leonard Lee Rue III, 15 (top). Van Cleve  
Photography/William Means: 18 (top), 66 (right), 70 (top), 74 (left), 86 (top),  
88 (both), 89 (both). Van Cleve Photography/Barbara Van Cleve, 20 (right).  
Van Cleve Photography/Gerry Souter, 23 (top). Van Cleve Photography/  
Peter Fronk, 42 (bottom). Van Cleve Photography/George Mars Cassidy,  
43 (bottom). Van Cleve Photography/Annette Donner, 51 (top). Van Cleve  
Photography/Bill Benoit, 130. Van Cleve Photography/James R. Simon, 139  
(right). Van Cleve Photography/NASA, 158. Van Cleve Photography/Burton  
McNeely, 178 (right). Van Cleve Photography/Bill Rogers, 185 (top). Zefa/  
Ray Halin, 9 (top), Zefa/W. Schmidt, 9 (bottom). Zefa/W. Kratz, 10 (bottom).  
Zefa/W. Maehl, 22 (right). Zefa/G. Koehler, 25 (right). Zefa/Shostal, 29 (top).  
Zefa/W. L. Hamilton, 38 (bottom). Zefa/J. Pfaff: 42 (top right), 114 (right).  
Zefa/H. Helbing, 71 (top). Zefa/Ungar Werbestudio: 87 (left), 172. Zefa/V. Mohn,  
166 (right). Zefa/M. Pitner, 174 (top).

TEACHER'S MANUAL FOR

# Exploring Science

**GOLD  
BOOK**

MILO K. BLECHA  
*Professor of  
Science Education*  
University of Arizona

PETER BEUGGER  
*Science Consultant*  
School District No. 44  
North Vancouver

PETER C. GEGA  
*Elementary School  
Science Specialist*  
San Diego State University

MURIEL GREEN  
*Supervisor of Science*  
Board of Education  
New York City, District 29

ARNOLD V. WIED  
*Principal*  
General Gordon Elementary School  
Vancouver

## *Reviewer/Consultants*

Ruth M. Buck

William Haisell

Lorraine B. Ide

Imogene C. Moody

Penny Sharpe

Cynthia M. Smith

Gladys Stanbury

Neva Lowe Weaver

**DOUBLEDAY CANADA LIMITED  
TORONTO**



# Contents

|  |                    |
|--|--------------------|
| <b>Introduction to THE LAIDLAW EXPLORING SCIENCE PROGRAM.....</b>        | <b>T3-T6</b>       |
| Objectives of the program.....   | T3                 |
| Rationale and approach.....  | T3-T4              |
| Organization and content.....  | T4                 |
| Processes of science.....  | T4-T5              |
| Role of the teacher.....   | T5-T6              |
| <br><b>Features of THE LAIDLAW EXPLORING SCIENCE PROGRAM.....</b>        | <br><b>T6-T8</b>   |
| Basic features.....  | T6-T7              |
| Special features .....   | T7-T8              |
| <br><b>Teacher's Edition for THE LAIDLAW EXPLORING SCIENCE PROGRAM..</b> | <br><b>T8-T10</b>  |
| Purpose and physical features<br>of the Teacher's Edition.....           | T8                 |
| The Teacher's Manual .....   | T8-T9              |
| Features appearing in the extended<br>bottom margins.....                | T9-T10             |
| <br><b>Instructional Materials.....</b>                                  | <br><b>T11-T12</b> |

*Project Director* Thomas E. Navta / *Staff Editors* Sally Wilmot Brown, D. Darragh  
Smithers / *Production Director* LaVergne G. Niequist / *Production Supervisor*  
Marilyn Scheda / *Production Associate* Judith E. Cihock

Copyright © 1977 by **Doubleday Canada Limited**

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage or retrieval system, without permission in writing from the publisher.

## Introduction to THE LAIDLAW EXPLORING SCIENCE PROGRAM

### Objectives of the program

THE LAIDLAW EXPLORING SCIENCE PROGRAM has been designed and developed to provide pupils with relevant, effective learning experiences in both the knowledge and processes of science. These learning experiences are presented in such a way that all teachers can be effective teachers of science. To help you and your pupils reach these goals, the authors and editors have selected the following objectives for the program:

- ▶ to provide an exciting study of science by appealing to pupil interest and curiosity;
- ▶ to develop up-to-date science concepts and understandings that are meaningful in the lives of pupils;
- ▶ to provide ample opportunities for pupils to explore science through easy-to-do, “hands-on” activities utilizing familiar situations and simple, everyday materials;
- ▶ to help pupils become skillful in using the processes of science;
- ▶ to integrate skills and concepts of the biological, physical, and earth-space science areas as well as skills and concepts of other disciplines;
- ▶ to provide a basis for the development of positive values and attitudes toward science in people’s everyday lives;
- ▶ to help pupils gain an awareness of the importance of their environment.

The following objectives reflect the concerns of teachers as to differences among pupils, cost and availability of materials, preparation time, and knowledge of science:

- ▶ to provide effective learning experiences for pupils with different interests and abilities;
- ▶ to utilize inexpensive materials that are common to the home or classroom for activities;
- ▶ to require preparation time and a background in science that are realistic for most elementary teachers.

### Rationale and approach

A considerable part of the pupils’ everyday life involves science in one way or another. Using this rationale, the authors and editors have approached science through situations and materials that are familiar to the pupils. Because of this approach, THE LAIDLAW EXPLORING SCIENCE PROGRAM relates to the everyday life of the pupils. The following characteristics of the program reflect this general rationale and approach:

**Activity oriented.** Each level of the program incorporates a “hands-on” approach using familiar, everyday materials in easy-to-do activities. In this way the pupils explore, discover, or verify concepts and ideas about objects and events. The illustrations and text material support and guide the pupils in performing and interpreting these activities.

**Integrated science.** The program integrates the skills and concepts of the biological sciences, physical sciences, and earth-space sciences. Because the program approaches science as part of the pupils’ everyday life, multidisciplinary relationships occur naturally. Skills and concepts related to health, safety, math, music, history, art, language arts, geography, and other disciplines are integrated with science throughout the program. As a result, the pupils begin to look at the world in fresh, new ways.



*Informal, highly visual style.* THE LAIDLAW EXPLORING SCIENCE PROGRAM stimulates and maintains pupil interest through a direct, informal writing style and the use of full-color illustrations. The photographs and drawings have been selected not only for visual appeal but also to help explain, clarify, and provide greater insight. The informal writing style and full-color illustrations help create a program with which the teacher and pupils feel comfortable.

*Use of humor.* Another integral part of the rationale and approach is that a science program can be fun. Humor is effectively used to create interest and to involve pupils. For example, a cartoon based on an amusing incident is used to help introduce each unit. Humor is occasionally used to develop a concept within a unit, also.

*Widening experiences.* As brought out, THE LAIDLAW EXPLORING SCIENCE PROGRAM consists primarily of science which is part of the pupils' everyday life. However, the program also takes the pupils beyond this point. This is done by including certain science topics that are significant but may not be of an everyday nature. Many illustrations also serve to widen the scope of the pupils' science experiences. Because of these aspects of the program, the pupils are stimulated and aided in exploring the unknown and unusual.

## Organization and content

The authors and editors have carefully structured the books to provide a consistent, functional organization which enhances effective teaching and learning. Timely and important content areas, such as the environment, are included in each book.

*Units.* There are six units in each book of THE LAIDLAW EXPLORING SCIENCE PROGRAM. Each unit explores a different topic of interest and importance to pupils. Balanced coverage of the life sciences, the physical sciences, and the earth-space sciences is maintained by having two units devoted to each of these three areas in each book. This carefully balanced content enables pupils to study the major areas of science every year. As pupils grow and mature from year to year, the content changes accordingly, taking into account the pupils' abilities, understandings, experiences, interests, and reading level.

The units can be studied in any order. Each unit is a self-contained teaching and learning unit. This adds a dimension of flexibility to the use of the program.

*Lessons.* Each unit is divided into lessons. The lessons aid in comprehension by breaking the unit topic into smaller teaching and learning packages. Each lesson provides information for an in-depth study of one or two of the main concepts of a unit.

## Processes of science

Inherent in any type of learning experience—whether it is in science, health, math, or any other area—are certain processes of learning. In science, these processes are sometimes referred to as inquiry skills.

THE LAIDLAW EXPLORING SCIENCE PROGRAM provides many opportunities for pupils to develop skill in using the processes of science. These opportunities are presented throughout the text, illustrations, and special features of the program, especially each of the "Finding Out" activities.

For ease of identification and reference, a list of these processes, or inquiry skills, and a description of each have been included on the next page.

**Observing.** Using the senses—seeing, tasting, touching, hearing, and smelling—to find out about objects or events in the environment

**Comparing.** Recognizing ways in which objects or events are alike or are different

**Classifying.** Grouping objects or events according to their observed characteristics

**Measuring.** Finding out about an unknown quantity by comparing it with a known quantity

**Using numbers.** Applying the operations of counting and measuring to objects or events under observation or study

**Using spatial relationships.** Perceiving and describing objects in terms of their shape, motion, position, or location

**Communicating.** Conveying information by means of oral or written descriptions, pictures, graphs, charts, maps, demonstrations, etc.

**Collecting data.** Combining as many processes as necessary to obtain information about objects or events

**Inferring.** Figuring out a conclusion based on observations of an object or event

**Interpreting data.** Explaining the meaning or the significance of information regarding an object or event

**Predicting.** Describing in advance the outcome of an event or process based on observations or data

**Hypothesizing.** Arriving at general statements of concepts from observations and data

**Experimenting.** Designing and carrying out procedures to obtain reliable information about interrelationships between objects and events

## Role of the teacher

For as many teachers of science that exist, there are at least the same number of science teaching methods. A method that works for one teacher may not work for another. Therefore, to be effective, each teacher must develop his or her own method of teaching science. The pupils' text and the Teacher's Edition have been designed to support and assist you in teaching and in developing a method of teaching science which is effective and enjoyable. Some of the general ideas that follow may also be of help to you.

**Inquiry techniques.** When teaching science, there has been a tendency for some teachers to feel that their role was mainly to dispense knowledge and answer questions. As a result, the teachers—rather than the students—did most of the work. It is often more effective for teachers to take on a different role, one in which they facilitate pupil inquiry.

To facilitate pupil inquiry, it is important for you to create an atmosphere of exploring, investigating, and finding out. To do this, you might pose interesting objects or problems for your pupils to investigate. During investigations, you might ask key questions now and then to stimulate investigation. You might also encourage your pupils to ask questions and have them try to find answers to their questions. You and your pupils may find that some questions have many answers and that others have no answers at all! These things will help keep your science lessons interesting and open-ended.

**Flexibility.** Another idea which may be helpful to you in developing an effective science teaching method is to try to remain flexible. For example, you may wish to follow the sequence of units as they appear in the program. Or, you may wish to vary the sequence according to the seasons to capitalize on pupil interest or availability of materials.

In addition to using the unit-opening cartoon to introduce a unit, you may want to make use



of an interesting demonstration or bulletin-board display. Another area in which being flexible is often important is the degree to which your science lessons are activity oriented. It is reasonable that you may want to make use of many activities for some lessons, but mainly use the text and illustrations for others.

To help enrich the concepts and activities in a unit, you may want to make use of community resources such as museums, factories, or parks. The possibilities are endless!

***Intuition as well as logic.*** Another important point to keep in mind is that it is equally important for pupils to develop intuitive thought processes as well as logical thought processes.

Intuitive thought processes are those processes that involve calculated guesses, hunches, and ideas such as "What would happen if I tried this?"

Most scientists agree that after all calculations have been made and all logical ideas have been pursued, it is often an intuitive process that brings the final solution to a problem. Pupils sometimes need a chance to manipulate or "play" with an object or a problem with no specific or immediate goal in mind. Pupils will often intuitively come up with questions, ideas, or solutions of their own. Through these experiences, they may begin to gain an awareness and appreciation of the aesthetics—the sheer beauty—in science.

## Features of THE LAIDLAW EXPLORING SCIENCE PROGRAM

### Basic features

The features of THE LAIDLAW EXPLORING SCIENCE PROGRAM have been developed and designed to excite pupils about science by providing high interest, visual appeal, involvement, relevancy, and success for pupils. These features can be categorized as basic features which permeate the entire program or as special features designed primarily for organizing and emphasizing content and activities. This section describes the basic features of the program.

***Illustrations and format.*** Perhaps the most obvious features of the program are the colorful illustrations and the open, uncluttered format. These two visual features create an attractive, appealing invitation to study science.

The illustrations are not only an important source for interest and appeal but they are also valuable aids to learning. Each illustration has been carefully selected for the purpose of help-

ing to explain, clarify, add new meanings, or provide greater insight.

The many illustrations which depict children in familiar situations help motivate pupils and involve them in the text. The illustrations also help pupils recognize that science is a part of their everyday life.

***"You" approach.*** To further the pupils' feeling of involvement, the text has been written using the "you" approach. The authors and editors have written the text as if they were speaking directly to each pupil.

***In-text questions.*** Not only does the text involve the pupils personally, but it also elicits responses from them by means of frequent questions. Most of the questions are inductive questions. They help the pupils relate their experiences and the

ideas presented in the text to the total concept being developed. Some of the questions involve the pupils' opinions or feelings.

**Vocabulary.** The number of unfamiliar words has been kept to a minimum. However, if a word important to the understanding of a concept is unfamiliar, the pupils are given an opportunity to use it many times to help strengthen their understanding of the word.

**Readability.** To help ensure ease of reading, the vocabulary and sentence length have been controlled according to "The Spache Readability Formula." Furthermore, extra space has been inserted between words to help ensure ease of reading.

The special consideration given the program's readability to ensure pupil success and interest is further emphasized by these previously mentioned basic features:

- ▶ a clear, direct writing style;
- ▶ illustrations that help pupils visualize topics and concepts;
- ▶ an open, pleasing format;
- ▶ a "you" approach that makes use of pupils' experiences;
- ▶ in-text questions to involve pupils.

**Metric measurements.** Metric measurements (SI) are used throughout the program. Metric symbols and terminology are based on the *Metric Style Guide* and the *Metric Practice Guide*.

### Special features

A variety of interesting and effective special features appear throughout the program. These special features are designed to help organize and present the content and activities of the program.

**Unit introduction.** A colorful, two-page introduction for each unit is designed to stimulate

pupil interest and to focus on the topic of the unit.

The first page contains the unit title and a colorful illustration. The illustration is made of three-dimensional art and carries the theme of the unit.

The second page contains an imaginative, full-color cartoon. The cartoon is followed by questions which help focus attention on the unit topic.

**Short, inquiry-oriented lessons.** Each lesson is introduced by a brief title which helps describe the lesson. The lessons are kept to a manageable length—some lessons are only one page and others are two facing pages. The lessons contain a minimum of text for the pupils to read. The text usually consists of one or two questions. These questions ask the pupils to respond to the pictures or to apply an idea developed in the lesson to their own experiences. Pupils who are not yet able to read can understand much of the lesson just by looking at the pictures.

**"Finding Out."** In THE LAIDLAW EXPLORING SCIENCE PROGRAM an activity feature, titled "Finding Out," occurs frequently throughout each book. Each of these activities provides opportunities for pupils to gain "hands-on" experiences and to use the processes of science. The concepts developed in the text are enhanced and extended through these activities.

In each "Finding Out," the steps for carrying out the activity are clearly and simply stated. The materials needed for the activity are simple, inexpensive, and easily found in the school or home. The setup of these materials is shown for the pupils to help them carry out the activity. Some of the activities require no materials at all.

The activity also includes questions which ask the pupils to explain their findings or relate their findings to the concept being developed. Many times, questions which open end the activity are given.



A few dimensions of flexibility in this feature are of particular note. Each "Finding Out" activity has been designed so that it can be carried out by individual pupils, by small groups, or by the entire class. Substitutes for materials shown in the activity can often be used. For example, the pupils may want to use glass jars instead of milk cartons if they are more readily available or if the pupils think they will give better results. Even some of the steps can be altered to fit the situation or the interests of the pupils.

**"Words to Know."** At the end of each unit, the important vocabulary words from each lesson are listed. This list provides the teacher and pupils with a handy tool for reviewing the important words of the unit.

**"Picture to Think About."** This end-of-unit feature contains a full-color illustration depicting some of the main concepts of a unit. The fea-

ture also has a question or statement about the picture, which helps the pupils apply the knowledge they have gained from the unit.

**"Questions to Answer."** The next feature at the end of a unit is a list of review questions. These questions are designed to help evaluate the pupils' understanding of the main concepts of the unit.

**"Fun Things to Do."** This feature is the last feature in every unit. It provides opportunities for pupils to reinforce and extend some of the concepts of the unit by means of simple, fun-type activities.

**"Some Science Words to Know."** A combined word list and index is provided at the end of the book. The list of words can be used to review the vocabulary for the units of the book. Page numbers for each word are given for ease of reference.

## Teacher's Edition for THE LAIDLAW EXPLORING SCIENCE PROGRAM

### Purpose and physical features of the Teacher's Edition

The purpose of the Teacher's Edition for THE LAIDLAW EXPLORING SCIENCE PROGRAM is to provide you, the teacher, with a variety of teaching aids which you can use conveniently and efficiently. The Teacher's Edition has been designed to help you guide your pupils in developing science concepts with ease and confidence.

The Teacher's Edition consists of full-color reproductions of each page from the pupils' text with extended bottom margins followed by a twelve-page Teacher's Manual. The copy and pictures from the pupils' text appear in the same size in the Teacher's Edition as in the pupils' text to help ensure ease of reading.

The inclusion of the pupils' pages makes it possible to easily point out something on the page for the pupils. The extended bottom margins make it possible to have a variety of specific teaching helps immediately available on the lesson page. Teaching helps which appear on the reproduced pupils' pages are printed in blue for easy identification. The Teacher's Manual contains information to help you understand and use all the components of the program effectively.

The sturdy wire binding of the book allows you to handle and use the Teacher's Edition easily and conveniently.

### The Teacher's Manual

The twelve pages which follow the reproduced pupils' text are referred to as the

Teacher's Manual. The Teacher's Manual contains information that will help you understand and effectively use THE LAIDLAW EXPLORING SCIENCE PROGRAM. The Teacher's Manual consists of the sections that follow.

**Introduction to THE LAIDLAW EXPLORING SCIENCE PROGRAM.** The objectives and approach of the program are presented with related science and science-teaching background information.

**Features of THE LAIDLAW EXPLORING SCIENCE PROGRAM.** The features of the program are described, and the function of each of the features is explained.

**Teacher's Edition for THE LAIDLAW EXPLORING SCIENCE PROGRAM.** Each feature of the Teacher's Edition is described. Suggestions as to how you can use each of the features in teaching are explained.

**Instructional Materials.** This section consists of a bibliography of instructional materials. The listing includes printed materials, films, and recorded materials. These instructional materials are categorized as general references or as materials appropriate for a particular unit.

### **Features appearing in the extended bottom margins**

A wide variety of teaching helps are conveniently located in the extended bottom margins of the Teacher's Edition.

**Preparing for the unit.** This feature appears on the first page of each unit. It contains page references for books, films, and recorded materials listed in the "Instructional Materials" section of the Teacher's Manual that are appropriate for use with the unit.

The page reference for each "Finding Out" activity in the unit is also included. This pro-

vides an opportunity to have your pupils collect, in advance, the materials needed for each activity.

**Introducing the unit.** The second page of each unit contains suggestions for using the unit-opening cartoon and questions to help introduce the unit to your pupils.

**Sample answers for questions below the cartoon.** The second page of each unit also contains sample answers the pupils might give for the questions below the cartoon. The questions and their answers are marked with corresponding superscript numbers.

**Main concepts of the lesson.** The main concepts of each lesson are concisely summarized on the first page of each lesson. This helps you see at a glance the main ideas to emphasize in teaching the lesson.

**Performance objectives.** Also appearing on the first page of each lesson is a list of performance objectives. The objectives state in behavioral terms the main things your pupils should be able to do after they have completed the learning experiences provided in the lesson. The objectives are stated simply and can be used to help you and your pupils establish specific cognitive goals for the lesson.

**Important words.** The important words of each lesson are also listed on the first page of each lesson. You may wish to use this list to emphasize certain words that are important in understanding the main concepts of the lesson and in strengthening science vocabulary.

**Suggested activity, discussion, or research.** Very often throughout a unit, suggestions for enriching a lesson are given. These suggestions may be ideas for a simple activity, a thought-provoking discussion, or some interesting research. Sometimes, a combination of suggestions is



given, such as "Suggested activity and discussion" or "Suggested discussion and research."

**Teaching helps for "Finding Out."** This feature appears on each page that has a "Finding Out" activity. The teaching helps are divided into sections. The first section, titled "Materials needed," lists the materials needed for the activity.

The next section, titled "Processes used," contains a list of the science processes that your pupils will develop and utilize during the activity. A list of these processes and their description appears on page T5 of the Teacher's Manual.

Another section, "Sample findings," describes what your pupils may find out while doing the activity. Of course, your pupils' findings may go far beyond those given. However, being aware of some of the possible findings in advance can help you in guiding the pupils in their activity and discussion. Instead of or in addition to "Sample findings," the section "Sample answers" may appear, giving sample answers to questions in the activity.

Two other sections which sometimes appear in this feature are "Additional information" and "Extending the 'Finding Out'." "Additional information" may provide helpful hints for carrying out the activity. Or, it may provide background information helpful in explaining the findings. "Extending the 'Finding Out'" contains suggestions for expanding the "Finding Out" or carrying out another activity related to the "Finding Out."

**Teaching helps for pictures.** The illustrations in each lesson are designed to help develop the concepts of the lesson. On many of the pages, specific teaching helps for using a picture are given.

**Sample answers for in-text questions.** Throughout the pupils' text are many questions for the pupils to think about and answer as they read the material. Sample answers to these questions are provided for you to help you keep a smooth

flow of discussion in your classroom. Of course, your pupils' responses may vary, and in many instances there are no right or wrong answers. The purposes of listing sample answers are to alert you to the kinds of answers your pupils are likely to give and to help you in guiding the discussion of the lesson. For ease of identification, the questions and the answers to the questions are marked by corresponding superscript numbers.

**Reviewing the important words.** This feature appears on the first color-tinted page at the end of each unit. It encourages you to have your pupils review the vocabulary words under "Words to Know" on that page.

**Applying knowledge.** This feature encourages you to have the pupils look at the picture in "Picture to Think About" and answer the question or statement that accompanies the picture.

**Sample answer for "Picture to Think About."** This feature provides a typical answer that the pupils may give to the question or statement that accompanies "Picture to Think About."

**Suggestion for evaluation.** This feature appears on the last page of each unit. It encourages you to use the questions under "Questions to Answer" on that page to help evaluate the pupils' understanding of the main concepts of the unit.

**Sample answers for "Questions to Answer."** This feature provides typical answers that the pupils may give to the questions under "Questions to Answer."

**For further involvement.** This feature appears on the last page of each unit. It offers suggestions for encouraging your pupils to carry out the activities in "Fun Things to Do" on that page and other fun-type activities which help reinforce some of the concepts developed in the unit.

## Instructional Materials

### General references for the teacher

Gega, Peter C. *Science in Elementary Education*, 3rd edition. Rexdale, Ontario: John Wiley & Sons, 1977.

This book provides a comprehensive explanation of how to teach elementary science. Part I introduces science organization, strategies, evaluation, and lesson planning. Part II contains model lesson plans that encourage children to learn through the development of their own critical thinking skills.

*Science 5/13 Series: Early Experiences and Early Explorations*. Agincourt, Ontario: GLC Publishers, 1973.

These two books are excellent resources for primary teachers. The activities described are manifold and unique.

### Unit 1 Food for Animals and You (pages 6-31)

#### *Books for children*

Balstrino, Philip. *Fat and Skinny*. Don Mills, Ontario: Fitzhenry and Whiteside, 1975.

Busch, Phyllis S. *Dining on a Sunbeam: Food Chains and Food Webs*. Richmond Hill, Ontario: Scholastic—TAB Publications, 1973.

Selsam, Millicent. *Animals of the Sea*. Richmond Hill, Ontario: Scholastic—TAB Publications, 1976.

Wolcott, Patty. *Tunafish Sandwiches*. Don Mills, Ontario: Addison-Wesley, 1975.

#### *Filmed or recorded materials*

*Animals—How They Live and Grow*, filmstrip series—set of 4. Scarborough, Ontario: McGraw-Hill Ryerson.

"Animals and Their Foods," film, 11 minutes. Markham, Ontario: Coronet Instructional Media.

*Animals on the Farm*, filmstrip series and charts—set of 9. Mississauga, Ontario: Cenco Canada.

*The Farmer's Animal Friends*, filmstrip series—set of 6, 23 frames each. Scarborough, Ontario: Prentice-Hall.

### Unit 2 Environment (pages 32-63)

#### *Books for children*

De Paola, Tomie. *The Cloud Book*. Don Mills, Ontario: Saunders of Toronto, 1975.

Howell, Ruth. *Splash and Flow*. Toronto, Ontario: McClelland and Stewart, 1973.

Pringle, Lawrence. *Water Plants*. Don Mills, Ontario: Fitzhenry and Whiteside, 1975.

#### *Filmed or recorded materials*

*The Changing Seasons*, filmstrip series. Don Mills, Ontario: Educational Film Distributors.

*Discovering Life Around Us*, filmstrip series. Toronto, Ontario: Visual Education Centre.

*Going Places in the City*, filmstrip series. Markham, Ontario: Coronet Instructional Media.

*Places Where Plants and Animals Live*, filmstrip series, 1975. Toronto, Ontario: Visual Education Centre.

"Spring Nature Hike," film, 11 minutes. Don Mills, Ontario: Educational Film Distributors.

### Unit 3 Measuring (pages 64-95)

#### *Books for children*

Hallamore, Elizabeth. *The Metric Book of Amusing Things to Do*. Toronto, Ontario: Greey de Pencier Publications, 1974.

*Macdonald Starters Series: Balancing Things*. Agincourt, Ontario: GLC Publishers, 1974.



Pine, Tillie S., and Levine, Joseph. *Measurements and How We Use Them*. Scarborough, Ontario: McGraw-Hill Ryerson.

*Filmed or recorded materials*

*Introducing Measuring*, filmstrip series. Toronto, Ontario: Holt, Rinehart and Winston.

*Measurement: How to Say How Much*, filmstrip set. Don Mills, Ontario: Longman Canada.

*Measuring Things*, filmstrip series. Markham, Ontario: Coronet Instructional Media.

"Metric Linear Measurement," "Metric Measurement of Area," "Metric Measurement of Capacity," filmstrips, with records or tapes. Scarborough, Ontario: E.T.H.O.S.

Primary Math Series, film loop series. Toronto, Ontario: Holt, Rinehart and Winston.

**Unit 4      Magnets (pages 96-127)**

*Books for children*

*Macdonald Starters Activities: Magnets*. Agincourt, Ontario: GLC Publishers, 1974.

Podendorf, Illa. *Magnets*. Stepping into Science Series. Stratford, Ontario: Scholar's Choice, 1971.

*Filmed or recorded materials*

"Magnets," filmstrip, with record or tape. Agincourt, Ontario: Cinemedia.

*Magnets*, filmstrip series—set of 6, 35 frames each. Scarborough, Ontario: Prentice-Hall.

"Magnets," filmstrip. Mississauga, Ontario: Cenco Canada.

"Magnets for Beginners," film, 11 minutes. Markham, Ontario: Coronet Instructional Media.

**Unit 5      The Moon (pages 128-159)**

*Books for children*

Freeman, Mae and Ira. *You Will Go to the Moon*. Mississauga, Ontario: Random House of Canada, 1971.

*Macdonald Starters Series: The Moon*. Agincourt, Ontario: GLC Publishers, 1974.

Shapp, Martha and Charles. *Let's Find Out About the Moon*. Toronto, Ontario: Grolier of Canada, 1975.

*Filmed or recorded materials*

"The Earth is a Big Turning Ball," "The Moon: Our Neighbour in Space," filmstrips, with records or tapes. Agincourt, Ontario: Cinemedia.

*First Adventures in Space*, filmstrip series—set of 6, 28 frames each. Scarborough, Ontario: Prentice-Hall.

"The Moon: New Frontier for Man," filmstrip, records or cassettes, 20 minutes. Toronto, Ontario: Visual Education Centre.

"Moon: Phases and Facts," filmstrip, with record or tape. Don Mills, Ontario: Educational Film Distributors.

"Moon, Sun, and Stars," filmstrip, 33 frames. Don Mills, Ontario: Educational Film Distributors.

**Unit 6      Rocks and Soil (pages 160-189)**

*Books for children*

Cartwright, Sally. *Sand*. Don Mills, Ontario: Longman Canada, 1975.

Heady, Eleanor B. *The Soil That Feeds Us*. New York: Parents' Magazine Press, 1972.

*Macdonald Starters Series: Dirt*. Agincourt, Ontario: GLC Publishers, 1974.

Page, Lou. W. *Rocks and Minerals*. Scarborough, Ontario: McGraw-Hill Ryerson, 1962.

*Filmed or recorded materials*

"Mountains: A First Film," film, 9 minutes. Toronto, Ontario: Holt, Rinehart and Winston.

"Our Earth: Land, Water, and Air," filmstrip. Don Mills, Ontario: Educational Film Distributor.

"Rocks Around Us," filmstrip. Scarborough, Ontario: McGraw-Hill Ryerson.

"Rocks for Us," filmstrip, with record or tape. Agincourt, Ontario: Cinemedia.











M2 39390818 CURR



\* 000006956130 \*

|              |            |
|--------------|------------|
| DUE<br>EDUC. | FEB 12 '94 |
| RETURN       | FEB 03 '94 |
| DUE<br>EDUC. | FEB 22 '94 |
| RETURN       | FEB 18 '94 |
| DUE<br>EDUC. | DEC 02 '93 |
| RETURN       | NOV 21 '95 |
| EDUC         | MAR 17 '95 |
| RETURN       | DEC 03 '95 |
|              | MAR 05 '96 |
| RETURN       | MAR 18 '96 |
| RETURN       | NOV 04 '96 |





~~B38775~~